

1920—Thirty Years of Service to Construction—1950

Contractors and Engineers Monthly

Vol. 47, No. 6

JUNE, 1950

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● Irrigation Canal

Ground water troublesome until contractor works with nature, not agin her: cuts a pilot trench to drain the site. Page 5.

● Bituminous Paving

Road-mix paving completes a relocation contract, as told on page 11.

Sub-base and plant-mix top out a previously built subgrade—page 17.

A state improves 3 city streets with black-top; maintenance story on page 39.

● Water Works

Tampa, third-largest city in Florida, expands its water-works plant—page 15.

● Harbor Dredging

Two hydraulic dredges deepen the historic harbor of Georgetown, S. C. Page 21.

● Seismic Techniques

C&EMonthly takes notes as a new tool for determining soil profiles gets a demonstration workout. Turn to page 26.

● Building Construction

In case you hadn't heard, Houston is on a building spree. Read page 31.

Fire took away, Contractor McKee restored, a race-track grandstand (page 51).

On page 97, the construction story of the new Yates Power Plant in Georgia.

● Turnpike Extensions

East-west arms are extending the Penn Turnpike's reach to 327 miles. Page 34.

● Tied-Arch Bridge

It replaces a fancy spiral-approach Mississippi River crossing 54 years old, now a dangerous bottleneck. See page 41.

● County Roads and Problems

The old formula—many miles, little money, but much ingenuity. Page 46.

How about it? Should local roads get more F-A? The BPR says no, on page 81.

● Dams Here and Abroad

A rolled-fill embankment at Enid, Miss., will check Yazoo Valley floods. Page 54.

Three dams are included in the French power project outlined on page 83.

Prepacked concrete will go into the Whittier Narrows Dam spillway. Page 94.

● Unusual Highway Drainage

With the camera standing by, 183 rows of drain-structure pipe are tucked away in New Mexico soil. See page 66.

● Berwick Lock, La.

Held up by the war, it is now finally completed. Pile driving and concrete work were done from a trestle. Page 73.

● Airport Dressed Up

Improvements reported on page 78 included a new apron and auto parking lot.

● Elevated Highway

Page 90 follows construction progress on the East Boston Express Highway: overhead structures, interchanges, and all.

● Care of Equipment

Page 101 tells how to choose, test, and service a small but vital component of engine well-being: the spark plug.

(You will find "In This Issue" on page 4)



AIRPORT. At Standiford Field in Louisville, a Buffalo-Springfield roller with a drag broom works limestone dust fines into a stone base course. The Breslin apron and parking-lot job is reported on page 78.



HIGHWAY. From high up on a gravel stockpile we see Peter Kiewit's Cedarapids crusher at work on sub-base and plant-mix material for the "All-Year Highway" in Wyoming. See page 17 for the story.



BUILDING. About 90 per cent of the concrete that went into the Yates Power Plant (see page 97) was placed by Pumpcrete. Here MacDougald's Bucyrus-Erie 10-B crane handles some pipe sections.

NEWS AND VIEWS

of the construction industry at home and abroad—volume and trends,
state and Federal legislation, labor and materials, people

June, mid-month of the mid-year of the century, puts us in a mood of recapitulation—**progress so far in '50**, and all that.

Last month, home builders expected to start on their 4,000,000th house since the war. There were 80,000 starts in January, says the Bureau of Labor Statistics . . . 80,000 in February . . . and in March, 110,000, **highest monthly peak in history**. New York exults that it completed 17 homes for low-income families every working day of its fiscal year ending March 31. And while we think of it, this month 8,000 New York City bricklayers in the A. F. of L. are exulting over the first pension plan ever established for them by contractors. They just signed a 2-year agreement with no pay rise but with a pension fund to start next January . . . contractors will ante up to 10 cents an hour for each bricklayer working in the territory covered by the new agreement.

ECA has approved the building of 16 electric-power projects (most of them thermal electric generating stations) in western Europe during the first 2 years of its operations: 9 for Italy, 3 for France (for an article on a big French power project, see page 83), and one each for Denmark, Greece, The Netherlands, and Turkey. These involve a total of 861,400 kilowatts and a total cost of \$176,876,029, including \$110,163,029 in ECA financing. But western Europe's deficit in electricity production will still run to 16 billion kilowatt hours, even by 1953.

As for airports here at home, progress only so-so, if that. H. G. Sours, former Ohio Director of Highways and past-President of the ARBA, told the American Association of Airport Executives that we need many more than our 6,500 airports worth about \$3 billion. (A Twentieth Century Fund study finds that we need twice as many airports as we have.) Though our national average runs about 2 to each county, 900 counties have no airfields at all, said Mr. Sours. And since airport development is far below that expected when the 79th Congress first set up machinery for Federal Aid to civil airports, the present Congress is being asked to extend to 10 years the Federal program originally contemplated for 5.

Road building is reaching the all-time dollar-volume high predicted for 1950, but our staggering needs make it hard to get excited about "progress". An ARBA survey estimates a 15 per cent increase in road construction for this year over last—\$1,446,732,000 as against \$1,262,506,000—plus \$452,782,000 worth of maintenance as against \$440,021,000. That makes a total of almost \$1.9 billion against \$1.7 billion, and a total mileage of 46,676 against 41,925. But only 25 states plan to spend more on roads this year . . . 19 plan to spend less and 4 plan to spend no more than they did last year.

As we write this, the Senate Public Works Committee is conducting hearings on **Senator Chavez' \$962 million F-A highway bill**. It differs materially from the House Whittington bill. In the first place, the Senate bill provides \$150 million for local rural roads (see page 81 for the BPR's views on local-road needs)—the state to put up 25 per cent of the cost of a given project, the county 35, and the Government 40. (The county cannot participate unless it employs or

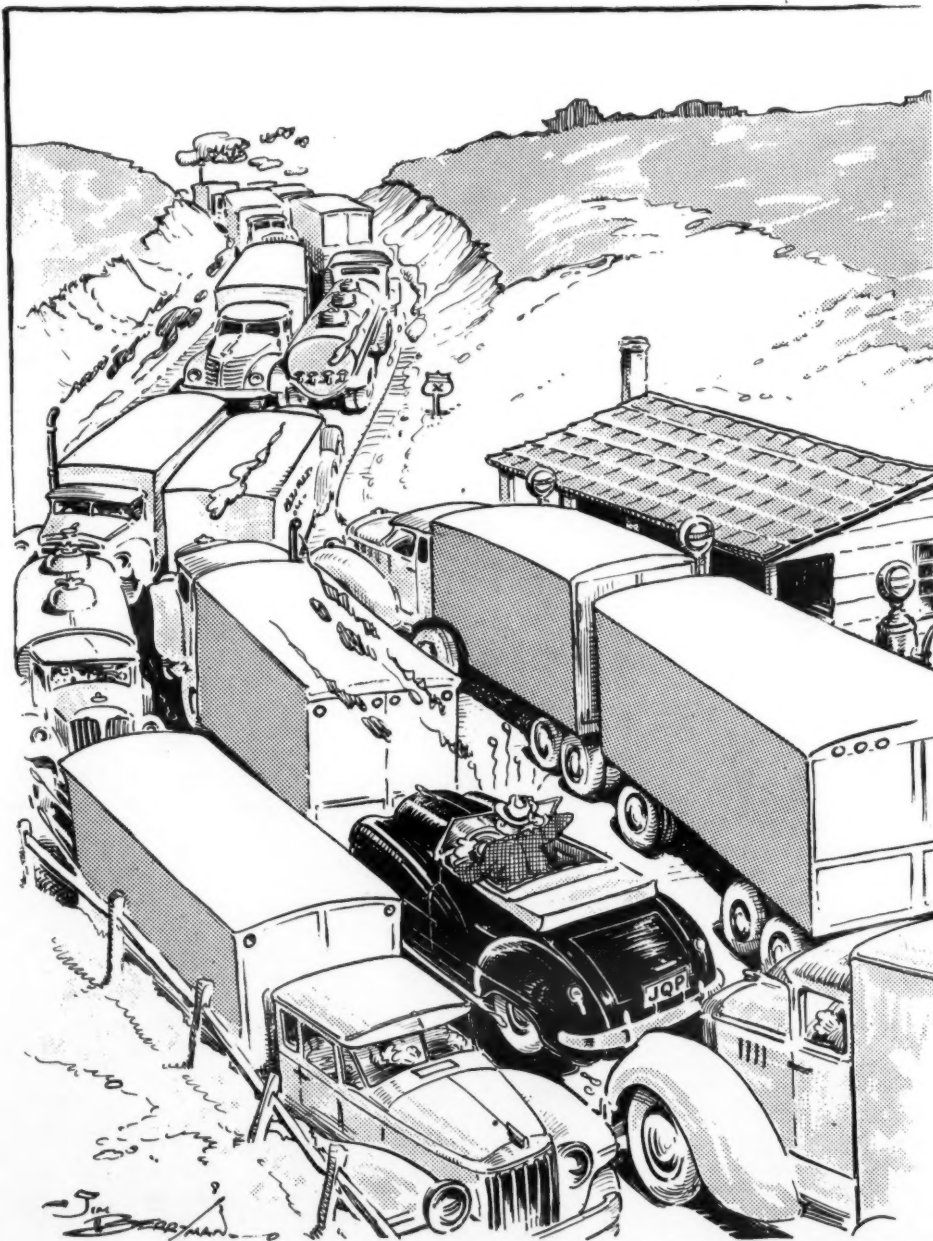
shares the services of a county engineer.) Also, the Senate bill authorizes \$550 million instead of \$500 million for the F-A System, \$100 million instead of \$70 million for the Interstate System, and a lump sum of \$50 million for routes of direct defense value. The Senate bill clings to the 50-50 matching basis instead of the House 75-25 proposal.

As pages of testimony multiply down in Washington, **states continue to turn to toll roads** as an answer to their needs. To recapitulate: a projected New York-to-Buffalo throughway (not tolls, exactly, but special user licenses) . . . a toll turnpike started in New Jersey . . . another projected in Virginia and North Carolina . . . another in Oklahoma . . . another in Ohio . . . one authorized in Colorado . . . one to be opened this sum-

mer in New Hampshire . . . one approved for engineering survey in West Virginia . . . a private one ventured in Texas . . . one under study in Alabama . . . a toll-road system authorized in Kentucky . . . bills pending in Michigan and Rhode Island . . . extensions under way for the Pennsylvania Turnpike (there's an article about them on page 34).

And so it goes, with no end in sight . . . as one state develops toll roads, its neighbors breed plans for connecting links. The U. S. now finds itself with **more than a billion dollars worth of toll highways projected** . . . and with pressure for more toll highways mounting as each new project is opened. Future domestic historians may well come to speak of 1950 as "the year the toll road took" in America.

ARE WE COMING TO THIS ?



Courtesy of Association of American Railroads

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Your Silent Partner— Your Surety Company

A surety company is a partner whom the contractor engages for a fee, said Henry G. Sheehy, Vice President of the Massachusetts Bonding & Insurance Co., San Francisco, in a speech which defined the function of a surety company and the relation of suretyship to the construction industry. The speech was given at the 31st Annual Convention of the Associated General Contractors of America, Inc., at the Palace Hotel in San Francisco.

The surety business, he said, is a small branch of the insurance field. Its importance "cannot be measured in premium dollars but . . . in its stabilizing influence . . . upon the many fields of [its] activity . . ." For example, the contract bond in the construction industry guarantees that in spite of unpredictable and hazards, labor and material bills will be paid and the contract will be fulfilled. The bond is a business safeguard. It eliminates undue risk. Its requirement is in no sense a reflection on the contractor.

Though a branch of insurance, surety must be distinguished from insurance, for insurance rates "are ordinarily calculated on the average risk for an entire class; whereas surety premiums contemplate the coverage of only selected risks of their particular class". Suretyship is given only to "those selected applicants who are responsible and who are expected to fulfill their engagements, keep their agreements, and satisfactorily perform their contracts".

Mr. Sheehy outlined the bases for the selection of surety risks: character, financial standing, and ability. Character is the fundamental consideration. The surety companies find in the contractor's character their only real guarantee that he will deal honorably with them, with subcontractors and materials men, and with the owner of the proposed construction.

The financial standing of the contractor is necessarily important to the surety; so is its estimate of his ability to perform. The contract price and the amount which the contractor must spend for equipment on the job are considered. The combined information is then evaluated in the light of a more or less flexible standard. And if the situation seems satisfactory, the contractor is issued a bond for not more than 1 per cent of the contract price. He has not merely a bond, but a partner, said Mr. Sheehy. His contract and his credit are guaranteed.

The qualifying process may be hastened by certain business practices. Mr. Sheehy advised his audience to use the services of a certified public accountant to prepare a monthly allowance for income tax. He recommended that a job fund be maintained for each contract. Such a practice lets the contractor know exactly how each project stands. This information will facilitate the extension of credit through either a banker or a surety.

The process of qualifying for a bond is of itself an asset to the industry, said Mr. Sheehy. "Were it not for the existence of this practice, the chaos which would result . . . beggars description."

Fiftieth Anniversary Marked By Frederick Snare Corp.

This year marks the fiftieth anniversary of the Frederick Snare Corp., Contracting Engineers, New York City. When the company was first organized in 1900, it confined its operations to the United States. But in 1902 it was invited to bid on pier and terminal work at Matanzas, Cuba, and that was the beginning of its activities in Latin America. The company now has, in addition to its main office in New York, branch offices in Cuba, Chile, Colombia, Ecuador, Peru, Puerto Rico, and Vene-

zuela. It has carried out construction work in many other countries in the West Indies and Central America.

Arthur W. Buttenheim is Chairman of the Board of Directors, and G. P. Seeley is President of the firm.

French Engineers Tour U.S.

A group of 19 French engineers toured the U. S. from April 6 to May 19, under the sponsorship of the Economic Cooperation Administration, to study

road building, earth-moving techniques, and tunnel construction. The Bureau of Public Roads, the Bureau of Reclamation, and the Pan-American Division of the American Road Builders' Association cooperated with ECA in arranging the tour.

Oklahoma Surveys Its Bridges

A survey just completed for the Oklahoma State Highway Department puts the number of substandard bridges

in the state's highway system at 1,051. The estimated total cost of replacing these 16 to 20-foot-wide bridges, built by counties during the horse and buggy days, is \$59,000,000, a sum several times greater than the Department's annual revenue.

H. E. Bailey, State Highway Director, says that Oklahoma intends to replace the outmoded structures as fast as revenues permit, but warns the public not to misuse existing bridges by ignoring load and height limitations.



NORTH CAROLINA

(left) For this farm-to-market road, a plant-mixed Texaco Sand Asphalt wearing surface was laid over a sand-clay base.

MASSACHUSETTS

(right) A Texaco Asphalt Macadam pavement was constructed on a 12-inch gravel sub-base and 4½-inch sand-filled stone base for this superhighway near Concord.

When highway "specs" call for Asphalt — —

FLORIDA

(left) Heavy-duty Texaco Asphaltic Concrete paving was used to widen and resurface 16½ miles of U. S. Route 1 near Jacksonville.

MINNESOTA

(right) Constructing a plant-mixed Texaco Asphalt pavement on 14 miles of State Highway 15, using pit-run gravel as aggregate.



road builders the country over choose Texaco



TEXAS

(left) Texaco Asphaltic Concrete paving plays important part in this State's program for by-passing traffic around the city of Austin.

SOUTH DAKOTA

(right) A 4-inch Texaco Sand Asphalt pavement is supported by a 6-inch stabilized sand-clay base on this section of U. S. Route 18.

Year after year, across America from Massachusetts to Texas and from Florida to South Dakota, road builders construct and resurface a substantial mileage of the nation's highways with Texaco Asphalt. This country-wide confidence was not earned overnight. It has developed gradually over a period of 45 years, during which road builders used and observed the performance of these asphaltic materials in thousands of road and street projects. They have noted the rugged durability and the low maintenance cost of Texaco Asphalt pavements on many of America's most heavily traveled arteries, under all kinds of climatic conditions.

Where traffic demands heavy-duty paving, construct plant-mixed Texaco Sheet Asphalt or Texaco Asphaltic Concrete. As an alternate type, use Texaco Asphalt Macadam, constructed by the penetration method.

For less heavily traveled roads and streets, choose a low-cost intermediate type of Texaco Asphalt surfacing, using either the road-mix or the plant-mix method.

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Two helpful booklets, covering all types of Asphalt construction, may be obtained without cost or obligation by writing our nearest office.



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TEXACO ASPHALT

Contractors and Engineers Monthly

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For the Highway and Heavy-Construction Industry

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They Dynamited the Fence

Do you remember when contractors and engineers couldn't cooperate because they were on opposite sides of the "fence"?

In one shining sector of today's construction picture, men have dynamited the fence and are burning the pieces. Cooperation between the Associated General Contractors and the U. S. Bureau of Reclamation is real enough to praise. By-products are lower unit prices, better specifications, standardized inspection, more jobs, and uniform results.

Men who snarled at each other from opposite sides of the "fence" five years ago now laugh about their previous position.

"We thought if we tried to cooperate with contractors, you'd soon be telling us how to design our dams," said Grant Bloodgood, Bureau representative at the last AGC meeting. "When we found out we were wrong, it was a pleasure to work with you."

"We thought the only answer Denver could give was 'No!'", George Atkinson said. "We found instead that top Bureau men had genuine interest in our problems. We called some headaches to its attention recently and the Bureau had the answers in an hour."

There are still a few sore spots, of course: more complete exploration data, better excavation classification, isolated examples of renegade inspection. But much has been done.

Bureau plans now give tolerances. The language is plainer. Writers eliminated "or as directed by the contracting officer" 79 times from one set of specifications!

Structure designs are becoming standardized. A new block-bid system of excavation estimating is a reality. It carries a guaranteed minimum, on which contractors can write off critical make-or-break costs.

Key field personnel now meet annually in Denver. Closer liaison between designers and field men can be expected. Out of these meetings should soon come a common set of inspection standards that will be Bureau-wide. "Tough" and "easy" resident engineers should soon be a thing of the past. The last meeting featured a lecture by R. P. Downs, top-flight Superintendent of the Bressi-Bevanda contracting organization from Los Angeles, builder of Olympus Dam for the Bureau. Here is tangible evidence of the cooperation men have talked about for years.

Prebidding conferences between the engineers and contractors are producing splendid results. They give contractors a chance to offer and receive information. They give designers a chance to eliminate costly or impractical fads.

Present cooperation between the AGC and USBR is real, effective, and

serious. Both "sides" estimate that millions were saved last year. A fine esprit de corps is growing.

Col. W. D. Luplow, representing the Chief of Army Engineers, was present in San Francisco. He heard the frank admissions and saw what cooperation had done. Through its prebidding conferences, the Corps has already come part of the way toward wrecking the fence. Colonel Luplow's presence can be expected to help that movement along.

Contract costs can be lowered significantly if state highway departments and other contracting agencies will duplicate the showing which the AGC and the USBR have made. A feeling of equal partnership must replace sectionalism if the barrier is to be removed permanently.

Besides, the view is broad and much more pleasant when the fence is down!

Do Kapok Vests Save Lives or Take Them?

To the Editors,

CONTRACTORS AND ENGINEERS MONTHLY:

The lead editorial in your March issue entitled "More Freedom Needed in Safety" was called to my attention by our Contracting Division Safety Supervisor. . . I can't think of anything more harmful to accident prevention than your magazine could have done than to publish this editorial. Although, as you know, a great percentage of the work of The Contracting Division of Dravo Corp. is marine construction, we have not had a drowning in that Division since 1934. This record is almost exclusively due to the enforced use of kapok life vests. I could cite innumerable instances where the life vest has saved the lives of men who fell into the river, unconscious, dazed, or otherwise unable to save themselves.

August in Minnesota is indubitably hot, but I would like to ask the author of this editorial if he ever felt the cold clamminess of a drownee. To comment specifically on the points made in the editorial:

1. Obviously the resident engineer was not sold, which is a fault of some safety engineer or someone in his outfit's management.

2. I have no opinion on the location of the yawl. There may have been good reason for it to be on the davits, or possibly it should have been at the stern.

3. Americans in general—and the American construction workers in particular—are not safety-minded. An important minority of them do not have and cannot be sold an individual willingness to work safely. Sometimes enforcement is necessary even with supervisors.

The kapok life vest as presently manufactured is not the final answer. It is not even a good answer, but it is the best answer which we currently have. It is my firm opinion that your magazine could have accomplished a great deal more if it had taken the same incident and pushed for: (1) dredges designed so that a man couldn't fall from them, and (2) research toward a more comfortable, efficient, and usable life vest, life belt, or other device.

Yours very truly,
Gerard O. Griffin
Director of Safety
Dravo Corp.
Pittsburgh, Pa.

Gentlemen:

Your March editorial "More Freedom Needed in Safety" makes sense. This required wearing of life jackets at all times on dredge work does not always result in safety. On a dredging job in Houston, Texas, not long ago, one of our crew fell overboard from a barge on which he was working. Somehow he got hung up underneath the hull of the barge, and by the time we got it moved to release him, it was too late. An hour of the pulmotor was no use.

We all felt that this man, who could swim well, could have slipped out from beneath the barge if the jacket had not pinned him against the bottom of the hull. I'll never go without a jacket while walking the pipe line, or when out on the ladder. But many times I'd rather have freedom of movement than be encumbered by a bulky jacket that can get fouled up on something beneath the water.

Yours truly,
Dredge Crewman
Memphis, Tenn.

Index to HRB Publications

The Highway Research Board has published a 147-page index to its publications. The index has two sections: a subject index with cross references, in which all papers and reports are listed under appropriate alphabetically arranged key words; and an alphabetical author index.

Copies of the index may be obtained by writing to the Highway Research Board, National Research Council, 2101 Constitution Ave., Washington 25, D. C. The price is \$2.70.

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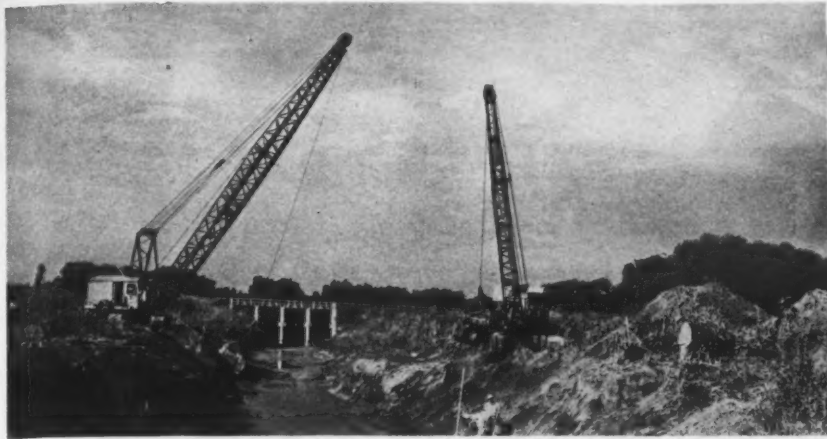
Safety Award to C&E Monthly

For the second year, CONTRACTORS AND ENGINEERS MONTHLY has received a Public Interest Award from the National Safety Council. These awards are made annually to public information media for exceptional service to safety.

Judges for the contest were Norman Damon, Vice President, Automotive Safety Foundation; Frank Luther Mott, Dean of the School of Journalism, University of Missouri; Wesley I. Nunn, Coordinator of the "Stop Accidents" campaign of The Advertising Council, and Advertising Manager, Standard Oil Co. (Indiana); J. E. Ratner, Editor, *Better Homes & Gardens*; Arthur Stringer, National Association of Broadcasters; Judith Waller, Director of Public Affairs and Education, Central Division of the National Broadcasting Co.; and Dwight Young, First Vice President, American Society of Newspaper Editors, and Editor of the *Dayton Journal Herald*.



"... and when I was a child I never had a little red wagon like the other boys ..."



Pilot Cut Drains Irrigation Canal

Ground Water Is Troublesome Threat to Reclamation Project In Agricultural Country Until Pilot Trench Is Made

BY working draglines on mats to excavate a pilot drain cut through the site of a future irrigation canal, a contractor whipped the most troublesome problem of his job. For a time the high ground-water table threatened to slow down the work a great deal, but by working with nature instead of against her, the Boise, Idaho, firm of J. A. Terteling & Sons, Inc., pulled a bad situation out of the fire.

At a contract price of \$1,000,000, the Terteling organization constructed 12 miles of the Cambridge Canal and approximately 12 miles of drains. The canal takes off from the Republican River at a diversion dam between Cambridge and Holbrook, Nebr., and runs easterly toward irrigable lands between that point and Oxford. The work is a part of the Frenchman-Cambridge Project of the U. S. Bureau of Reclamation, and is a part of the Pick-Sloan Plan for the Missouri River Basin.

At the upper take-off point, Cambridge Canal passes through silty land where the water table lies close to the surface. In places it was only 3 or 4 feet down, which made the excavation of a canal 12 feet deep a bit difficult. The water seeped in immediately whenever an excavation was opened. It was practically impossible to set any kind of heavy equipment on the soft ground, which became spongy as soon as the machines started to work.

Explorations and borings had indicated there might be trouble of this kind, and before the ground-water situation had been whipped, about 5½ miles of the wet construction had been encountered.

A Self-Draining Scheme

Officials toyed with the idea of drying up the water with wellpoints, but that was too expensive. General Superintendent Harry D. "Red" Durston, an old-timer who has fought everything from water to blue granite in his long association with construction work, believed that he knew the answer. He figured that if he trenched out the center part of the canal, carrying the pilot cut to the approximate 0.0003 slope shown on the plans, the sand beneath the farmland would be porous enough to drain.

Starting at the lowest point of the wet section, Durston put a Northwest dragline with a 70-foot boom and a 3½-cubic-yard Hendrix lightweight mud bucket to work. The machine found the start of the ground water and began to dig the pilot trench. Very shortly the ground became so spongy the machine had to use pads to dig and travel.

Durston carried the pilot cut as close to finished grade as possible, and was never more than a foot away from the final canal floor. As he expected, the ground water began naturally to run out through the porous sandy formation underneath. Soon the pilot trench

was carrying a good stream of water. As the machine excavated the trench, the material was thrown well over to the side, out of the way. The water-

logged condition of the ground made it difficult to pick up a full bucket of material, so only a pilot cut was made at (Continued on next page)

ALL-WEATHER
Finest for flotation,
rolling big loads faster.

HARD ROCK LUG
Super-tough clamp for
all types of rock work.

SURE-GRIP
Tops for drive-wheel trac-
tion on graders and pans.

3 best ways to move the earth

Each of these job-proved Goodyear tires has a specially engineered tread and body to handle best a particular type of construction hauling need—each, in its proper type of service, cuts tire cost per mile,

steps up schedules, provides longer-lasting performance. Proof is the fact: *More tons are hauled on Goodyear tires than on any other kind.* Remember, always BUY and SPECIFY Goodyear—it pays!

GOODYEAR

All-Weather, Sure-Grip—T.M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

Pilot Cut Drains Irrigation Canal

(Continued from preceding page)

that time. Under normal conditions the machine would have backed up the center line of the canal, excavating the whole thing as it went along.

After the pilot cut had been made, and the site allowed to drain for about 3 weeks, a remarkable change took place. The surface of the ground became dry and firm. The water table dropped from 8 to 10 feet, and now lay near the canal bottom. It was then possible to bring the Northwest dragline back in, this time without pads, and muck out the remaining two blocks of excavation. Since the pilot cut had been made slightly off center, the machine took out both side slopes and the main center material on its second pass.

The Cambridge Canal takes off at the diversion dam with a bottom width of 16 feet, side slopes of $1\frac{1}{2}$ to 1, and a water-carrying capacity of 325 cfs. After about 550 feet it narrows to a bottom width of 15 feet, with the same side slopes. With the exception of approximately 1,000 feet of raised canal, where the route passes over low ground, all of the 557,000 cubic yards of excavation were in cut sections. Construction of drains, on a smaller cross-sectional scale than the canal as a rule, made another 600,000 cubic yards of excavation, thus boosting the total dirt work well over 1,000,000 yards.

Durston used two Northwest draglines—the other a new 80-D with a $2\frac{1}{2}$ -yard bucket. With two draglines casting the excavated material, good progress was made. Each machine was good for 1,200 cubic yards per shift, including the time when the machines fought the water and mud, according to R. L. Hansen, Excavation Superintendent.

Fortunately, no rock was found, and the digging consisted of silt, topsoil, clay, and sand. A great deal of the material excavated and cast by draglines had to be rehandled by tractor equipment to balance out the dirt and leave a presentable appearance along the new irrigation-delivery artery.

The tractor equipment fleet consisted of four Caterpillar D8's with Le-Tourneau Carryalls. This equipment hauled dirt and built up the canal cross section through the low spots. Sheep-foot rollers compacted the embankments. The earth work in a canal bank



C. & E. M. Photo

A Truck dumps materials for a 4/5-cubic-yard batch into the skip of a truck-mounted Rex 16-S mixer on Terteling's canal job.

must be tight, so the sections were built slightly full, and then trimmed back to solid material by a Caterpillar No. 12 motor grader.

Excavation work was carried forward

on a double 8-hour shift basis, 6 days a week. Extremely bad weather during the spring months last year interfered time and again with the machines. It was impossible to get fuel and oil out

over the muddy haul roads, and tougher still to dig, if there is such a thing as tougher than "impossible"!

Minor trimming, shallow excavations, (Continued on next page)

BULLDOZERS & TRAILBUILDERS

LOADERS

RIPPERS

TILTING AND ANGLING BLADE BULLDOZERS

TAMPERS

HAULING SCOOPS

DUMP BODIES

FOUR WHEEL SCRAPERS

BOTTOM DUMP WAGONS

TREEDOZERS

SOUTHWEST Construction Equipment
for every job!

Southwest's complete, standardized line affords construction men an opportunity to fill their needs from one dependable source. From start to finish, no matter whether Allis-Chalmers, Caterpillar, International or Cletrac tractors are used, an economical Southwest unit is available to bring you increased profits.

In addition to the standard line, special Southwest Dump Wagons, Tampers, Heavy Duty Compaction Units, etc., are giving outstanding performance on out-of-the-ordinary jobs all over the country . . . Why not let Southwest help solve YOUR problems?

CONSTRUCTION MACHINERY DIVISION
Southwest Welding & Manufacturing Company
ALHAMBRA, CALIFORNIA

IS RE-ROPING ONE OF YOUR "Headaches"?



If so—look to Electroline Wire Rope Fittings! These permanent wire rope fittings prolong the life of wire rope by damping vibration stresses and overcoming rope fatigue at entrance to fittings—Electroline Fittings Definitely Minimize Re-Roping!

But this is just one of the many outstanding advantages of these positive-grip fittings. Send for illustrated, pocket-size Catalog and learn how you'll profit by using Electroline Wire Rope Fittings.



Electroline Company

4121 SOUTH LA SALLE STREET
CHICAGO 9, ILLINOIS



C. & E. M. Photos

At left, carpenters and steel setters place forms and steel in one of the Cambridge Canal structures. Above, the Terteling concrete crew places a low-water vehicular crossing over one of the drains in the contract.

and so on were handled by a $\frac{5}{8}$ -yard Link-Belt Speeder truck-crane, which also saw service on some of the concrete pours.

Durston's general organization of key men was the same group which 3 years ago on the Tucumcari, N. Mex., irrigation project initiated the use of radio communication to such good purpose. The key cars and pick-ups still have the same Motorola communication equipment as they did at that time, and one of the first things any of these men does early in the morning is to switch his radio on. They have learned that it is good insurance to make a hard day's work easier.

Many Concrete Structures

The Terteling job called for over 105 concrete structures and 9 pile bridges. The reinforced-concrete structures which are necessary to handle the water include drops, checks, turnouts, siphons, low-water vehicular crossings, canal crossings, and drainageways under the canal. Of the 6,000-cubic-yard concrete total in the project, only one structure has over 500 cubic yards. Most of the structures are comparatively small, some having as little as 10 cubic yards.

Form work for these small structures, however, was none the less intricate because of size. Some of the training walls at the siphon structures, with their flared ends, presented problems of layout which made the Nebraska carpenters scratch their heads. When a wide wooden layout platform was built, where the panels could be laid out to exact scale, their work became easier.

All form work was prefabricated in panels in a central yard near the railroad track in Holbrook, Nebr. The necessary lumber could be easily shipped in and unloaded there, and power was available to run the various rip, band, and portable saws which were used. The forms were made generally with 1-inch shiplap facing nailed to 2 x 4-inch studs. In a few cases of bridges and other visible work, some of the most exposed faces were lined with Masonite.

The panels were then trucked out and set up by the Link-Belt Speeder truck-crane. Richmond and Universal patented form ties were used to hold

opposite panels from spreading, and the pours were also supported by 4 x 6 braces extending from the wales back to the banks.

In a few places, structure excavation and the subsequent placing of forms went down so deep that the ground-water condition was unusually bad.

Durston used an 8-inch Gorman-Rupp pump to remove the water from sumps in these locations. The pump picked up (Concluded on next page)

Automotive Shovel With Hydraulic Crowd and Hoist Speeds Up Excavation Work

Unit Reduces Excavation Costs; Loads Up To One Cubic Yard A Minute

MOVING SHOVEL LOADERS to and from jobs is one of the most expensive unproductive costs in excavation work. Contractors lose hundreds of hours and spend thousands of dollars annually moving this equipment. Developments since the war show that contractors can be relieved greatly of these costs. One of the most successful developments has been the manufacture of the rubber-tired Dempster-Diggster shovel loader that travels at truck speeds.

Digs Through 15 Foot Bank

Construction men have found that on big jobs the Dempster-Diggster has no equal for working in tight places and for freeing big shovels for heavier work. The Diggster has an 8 foot 10 inch crowding reach, will dig through a 15 foot bank, and will dig 15 inches below grade.

Manufacturer's tests and contractor's reports show that the Diggster will load up to one cubic yard a minute. This speed in excavation is accounted for, mainly, by the Diggster's exclusive independent hydraulic crowd and hoist action, the hydraulic steering, and wheel-type traction.

The power crowd permits bucket to keep digging until loaded . . . no digging with wheels. The hydraulic steering gives the driver sensitive, finger-tip control. When accelerated, a one-handed twist of the steering wheel puts the machine in any desired position. By operating on rubber-tired wheels, the



THE DEMPSTER-DIGGSTER is shown here digging out a 15 foot bank of hard chert. The power crowd permits bucket to keep digging until loaded . . . no digging with wheels.

Diggster, of course, can move at the fastest possible speed.

Not A Fair Weather Machine Only

Under adverse conditions on a state highway near Charleston, W. Va., recently, the Diggster loaded 150 cubic yards of sticky blue clay in only three hours. The work consisted of cleaning up slides on 14 foot embankments on both sides of a concrete road. The weather was not cooperative, inasmuch as considerable rain fell the night before. But the Diggster showed no tendency to slide. The job foreman stated that it loaded more material in two hours than the $\frac{3}{4}$ and $\frac{1}{2}$ cubic yard truck shovels normally did in an entire day. This and many other operations in inclement weather have proved that the Diggster is not a fair weather machine only.

The Dempster-Diggster has a 15 foot turning radius, is 20 feet long when bucket is in traveling position, and is nine feet and six inches in height.

Four standard interchangeable buckets of two types are available. Diggging buckets with four bottom teeth in 1 and $1\frac{1}{4}$ cubic yard (heaped) capacities. Materials handling buckets in $1\frac{1}{2}$ and 2 cubic yard (struck) capacities.

Crawler Traction Available

For fast, efficient operation in difficult terrain, the Diggster is available with crawler-type traction.



Complete information and prices may be obtained by writing the manufacturer, Dempster Brothers, Inc., Knoxville, Tenn.



DEMPSTER BROTHERS
460 Shea Bldg.
Knoxville 17, Tenn.

the new *Detection*

PIPE LOCATOR

"The Greatest Improvement in Years"

MODEL 505

Consider these Features:

- Matchless Performance
- Unequaled Circuit
- Shielded Leads
- Metal Case—Modern, Smart
- Greater Depth—Simpler Control
- Greater Sensitivity
- Light Weight—Easily handled

All these and many more at a **NEW LOW PRICE**

THE ONLY PIPE LOCATOR WITH THE **LIFETIME GUARANTEE**

For information write to Dept. E-1

THE *Detection* CO.

5637 CAHUENGA BLVD. NORTH HOLLYWOOD, CALIF.



ENCLOSED STEEL CAB protects operator against inclement weather.

Pilot Cut Drains Irrigation Canal

(Continued from preceding page)

a great deal of sand in the process, which was hard on its impeller, but it dried up the holes until the concrete could be placed.

Portable Concrete Mixer

A concrete mixing outfit so portable it could move between pours in a matter of a few minutes was used. The equipment, all of which was mounted on a large flat-bed truck, consisted of a Rex 16-S concrete mixer, two water storage tanks of 1,000-gallon capacity each, a wooden surge hopper holding 2 cubic yards of concrete with dump gates on each side of the truck, and a small storage reservoir for Protex air-entraining agent.

Three war-surplus trucks, owned by the company, hauled 5 batches at a load, and dumped the dry-weighted material to the mixer skip. A short rail extension permitted the mixer operator to lay his skid down on the ground where the trucks could reach it. The concrete was then mixed, dumped into the proper side of the surge hopper, and drawn out as needed.

In the case of small pours, a 12-man concrete crew wheelbarrowed the fresh material to the forms. For pours larger than 30 or 40 cubic yards, a 1-yard transfer bucket was used, and it was handled by a crane. The small Link-Belt Speeder did quite a great deal of this work.

Concrete materials consisted of sand, dolomite aggregate, and Ideal Type II low-alkali cement, with enough Protex to entrain 4 per cent of air. The sand was shipped in by rail from Big Springs, Nebr., on the Platte River. Most of the aggregate came in from Guernsey, Wyo., and was shipped by rail in two sizes: 1½-inch maximum and ¾-inch maximum.

As the cars came in to Holbrook and were spotted on the siding, a Mack-mounted Browning clamshell unloaded the materials and then transferred them to the batching bins of a small Johnson manual plant. Batch trucks backed under the plant to pick up their loads, and drove past a wooden platform at the cement shed, where the sacks of cement were added. The sacks were not broken until the truck was at the mixer, ready to unload.

Materials to make a 4/5-cubic-yard batch were weighed out according to the following formula:

Sand	722 lbs.
¾-inch aggregate	718 lbs.
1½-inch rock	856 lbs.
Cement	376 lbs.

All concrete on the project was cured by Sealtext membrane curing solution, and satisfactory results were reported. The individual structures, poured by the fast-moving portable mixer, were completed rapidly, and Superintendent Durston had the project finished by December, 1949.

Personnel

In addition to General Superintendent Durston, other assistants included Grayson Carl on concrete, R. L. Hansen on excavation, and C. A. Peterson as Office Engineer. R. O. Winkler was Project Engineer for the Terteling organization.

The Cambridge Canal was designed under the general supervision of the Chief Engineer of the Bureau of Reclamation. C. M. Jackson was Construction Engineer in charge of field work, under the administrative supervision of the District Manager at Indianola, Nebr.

Named Road-Equipment Head

Ray Cartwright, formerly Manager of the St. Louis District Office of Standard Steel Works, has been named Manager of Road Equipment. From headquarters in North Kansas City, Mo., he will

supervise sales throughout the U.S. of Standard's asphalt distributors, tar kettles, construction brooms, gravel spreaders, etc.

Materials Hauling With Improved Buggy

An improved model of the Whiteman Power Buggy is announced by the Whiteman Mfg. Co., 3249 Casitas Ave., Los Angeles 39, Calif. New features include a curved rack and pinion mechanism to improve leverage and give the operator full control of the dump and return of the bucket when partial dumping is required.

Speed of the Power Buggy has been increased from 12 to 16 mph. Carrying



Speed and carrying capacity have been increased in the new Whiteman Power Buggy, and weight distribution and maneuverability have been improved.

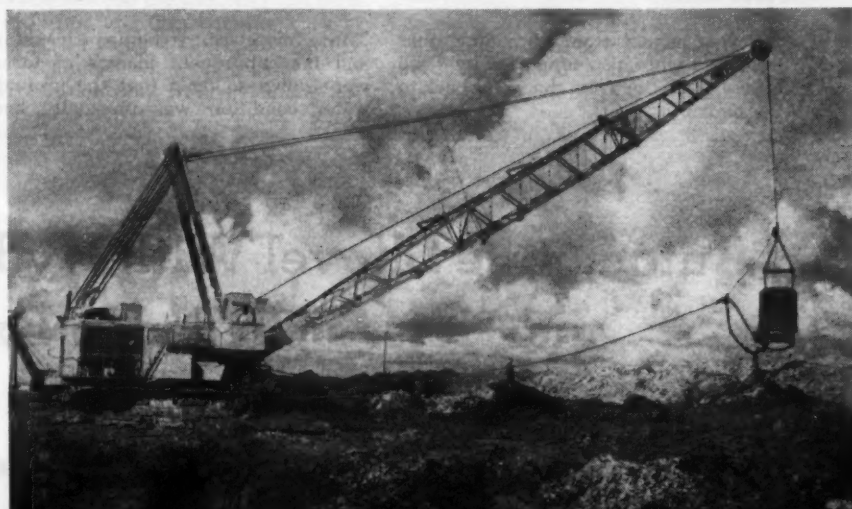
capacity has been enlarged from 12 to 13 cubic feet. Maximum load is 2,000 pounds. The lower center of gravity,

wider tread, and shorter wheelbase are designed to give better distribution of weight and improve maneuverability. The Buggy is powered by a 7.5-hp 4-cycle air-cooled engine. It has an automatic clutch and speed changer, power to pull a load up 25 per cent inclines, and possesses the ability to turn in its own length.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 62.

Executive V. P. for Smith

J. M. Floyd, who has been Vice President in Charge of Manufacturing for the A. O. Smith Corp., Milwaukee, has been named Executive Vice President of the company.



A D386 "Cat" Engine powers this Maniotowoc dragline, with 6-yd. bucket and 120-ft. boom, building levee on Galveston Bay. Owned by McGinnes Bros. Construction Co., Houston, Texas.

"Cat" Engines



This crushing plant, owned by Arthur R. Alvis, Butler, Mo., has a "Caterpillar" D375 Engine driving a Universal pulverizer. Capacity, 125 tons of road rock per hour.



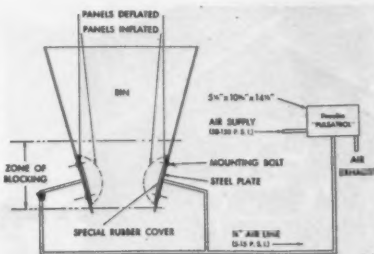
Two "Cat" D397 Electric Sets, each with capacity of 314 kw., furnish light and power for Cedar Bluff Dam construction job. Contractors, Lytle-Amis & San Orr, Ellis, Kans.

BUILT FOR

Pulsating Panels Aid in Bin Feeding

To help stubborn materials through bins and hoppers, a pneumatic device called the PneuBin has been developed by the Gerotor May Corp., Dept. E, Baltimore 3, Md. Pulsating PneuBin panels, strategically mounted on the inside walls of bins or hoppers keep materials moving by positive displacement and prevent arching, funneling, and tunneling. Flexible covers for the panels are made of reinforced abrasion-resistant Goodrich Armorite rubber.

Air flow to and from the panels is automatically regulated by the PneuBin Pulsatrol unit, which permits selection of a wide range of pulsation frequency, force, and amplitude, the company says.



Air flow to and from these PneuBin panels, which are mounted on the inside wall of a bin or hopper, inflates and deflates them. The pulsating movement keeps stubborn materials from arching, funneling, and tunneling.

Features of the PneuBin, according to Gerotor May, include direct action on bin contents rather than bin, easy in-

stallation, quiet vibrationless operation, safety, and economy. Use of the PneuBin permits closed bin tops.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 34.

Link-Belt Co. News

David E. Davidson was elected Vice President for Sales at the annual meeting of the Board of Directors of the Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill. He was formerly General Manager of the Company's Pershing Road Plant in Chicago. Eugene P. Berg has been promoted from Assistant General Manager to General Manager of the Pershing Plant to replace Mr. Davidson.

Self-Computing Rod Records Elevations

A new direct-reading rod for taking elevations without computation has recently been designed by the Lenker Mfg. Co., 599 Chestnut St., Sunbury, Pa. Records of foresights and backsights, as well as computations of height of instrument, may be eliminated in the new two-column system permitted by the rod. Only station and elevation need be recorded in the notebook.

Principal feature of the Lenker L-E-Vation rod is a movable scale band, with numbers reading downward, that permits a direct reading of elevation without computation. It works this way: the level man sets the endless revolving steel band, which is graduated in feet, tenths, and hundredths, to the recorded elevation of the bench mark. The band is clamped to the back section of the rod and is set for reading elevations. Since the numerals read downward, a transfer to a position higher than the bench mark will automatically read the higher elevation. The reading of any point taken from the set-up of the instrument will be the elevation of that point and may be entered directly into the notebook without any further reductions. This method is particularly adaptable where a number of elevations are to be taken from one set-up.

The rod is of maple, made in two sections for extension purposes. It is 5.4 feet long when closed and 10 feet when extended. A 13-foot reading may be obtained by using a 3-foot boot.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 84.

Masonry Drill Bits

A new twist-type masonry drill bit, featuring a blade of vacuum-sintered cemented carbide, has been developed by Kennametal, Inc., Latrobe, Pa. Two features are claimed for this drill: an angled cutting point designed to eliminate almost completely motionless dead center; and a faster spiral which cleans out dust at an accelerated rate. These drills fit standard rotary electric drills and are for drilling all forms of masonry. They are made in 12 sizes, from 1/4 to 1 inch in 1/16-inch increments.

Further information may be secured from the company by requesting Bulletin K-109. Or use the Request Card at page 16. Circle No. 129.

Convertible Excavators

Literature describing 3/4 and 1/2-cubic-yard excavators has recently been prepared by The Osgood Co., of Marion, Ohio. These machines, Type 5 and 20 respectively, are convertible to shovel, dragline, clamshell, crane, and hoe.

The literature points out that the front-end attachments are interchangeable, tread links are available in several widths, and inserts for the crane boom provide a flexible digging and material-handling tool. All features, applications, and specifications for the units and their component mechanisms are listed in the folders. Crane lifting capacities are approximately 8,000 pounds and 15,000 pounds for the Model 50 and Model 200 respectively.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 10.

Pelsue Joins Jaeger

H. F. Garvin Pelsue, former President of the Metropolitan Sand & Gravel Corp., New York City, and a past President of the National Ready Mixed Concrete Association, is now with The Jaeger Machine Co., Columbus, Ohio, in charge of research. He also heads Jaeger's advisory engineering service to producers of ready-mixed concrete.

BACK of the high preference for "Caterpillar" power on construction jobs is a long experience of profitable operation.

Construction men know they can depend on steady, day-in-day-out performance from "Cat" Engines and Electric Sets. And they know they'll get 24-hour service—anywhere—from "Caterpillar" dealers.

The right power for every type of job is now available in the complete "Caterpillar" line. There are ten Engines, ranging in size up to 500 hp. (maximum), and ten Electric Sets, up to 314 kw. (12-hour duty).

Over 150 manufacturers make "Cat" Engines available as power for their equipment. They know that quality power adds to the performance of their product—gives greater satisfaction to the user.

When you order new construction equipment, specify "Cat" Diesel power. Your "Caterpillar" dealer will be glad to show you how the big yellow machines will meet your requirements.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

FOR CONSTRUCTION MEN

LOOK UNDER THE HIDE

for the quality that pays off in performance!

The built-in quality of "Caterpillar" Diesel Engines doesn't show on the outside—but it shows up in performance. Just take a few examples of the hundreds of hidden quality features that give "Cat" Diesels their long life and dependability.



"Caterpillar" intake and exhaust valves are made of highly alloyed, heat-resistant steels. Their ample size and close machining and heat-treat specifications have resulted in thousands of hours of trouble-free valve operation. Valve and rocker arm design are matched to reduce wear. Valves in the D397, D386, D375 and D364 Engines have special hard facings on contact surfaces, and have valve rotators and hardened valve seat inserts to reduce seat wear.



Fuel pumps are "Caterpillar"-designed and "Caterpillar"-built. Made of the cleanest high-chromium, high-carbon alloy steel obtainable, the pump plungers and barrels are diamond lapped. Pumps are heat treated to maximum hardness to give users thousands of hours of trouble-free, economical service. There is an individual pump for each cylinder. Pumps are free from adjustment and interchangeable.



The fuel injection valve offers owners maximum simplicity in design. Machined to extremely close limits, these valves are made from the finest quality materials—and are subjected to very detailed hardening processes. Valves are completely interchangeable and are adjustment-free. A large single orifice minimizes fouling. With the matched design of valves and precombustion chambers, owners use low-cost, non-premium fuels to get top economy.

CATERPILLAR

DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT



The Hercules Tipster converts $\frac{1}{2}$, $\frac{3}{4}$, and 1-ton pick-ups into dump trucks.

Pick-Ups Converted To Light Dump Trucks

A new pick-up dump conversion, designed to reduce the time and labor needed for unloading pick-up trucks, has been engineered by Hercules Steel Products Corp., Galion, Ohio. This engine-driven low-mount Tipster converts $\frac{1}{2}$, $\frac{3}{4}$, and 1-ton pick-ups into dump trucks. Its main elements are a Hydra-Clutch pump, a clutch-type hydraulic pump that is fan-belt powered and operated only when dumping; a steel understructure for mounting under the pick-up body; and twin-cylinder hydraulic hoist rams. The principal feature of the Tipster, according to Hercules, is that rapid unloading can be handled from the cab of the truck, since the Hydra-Clutch is operated by a single dashboard control.

The Hydra-Clutch pump is installed in an accessible place under the hood. With the hoist mechanism and steel understructure in place, the mounting height of the truck body is increased less than one inch. Channels and cross members of the understructure are of structural steel welded into one integral unit.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 117.

Material-Handling Products: Hooks, Slings, Grips, Etc.

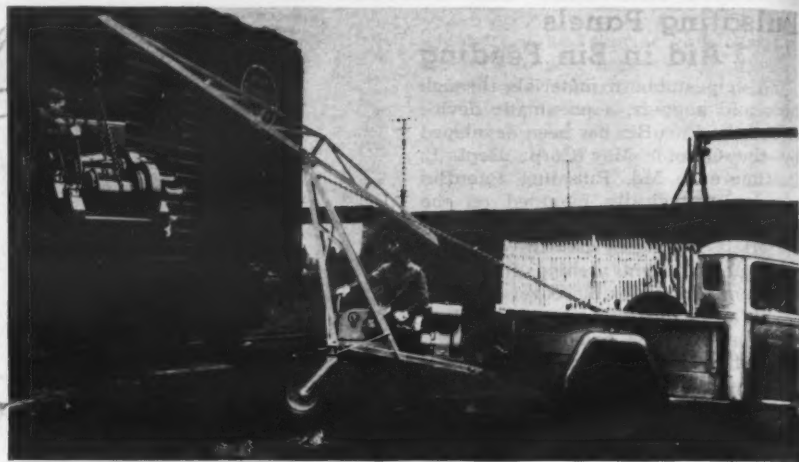
A new 24-page illustrated catalog on hooks, tongs, grips, slings, and piling pullers for use in construction and marine contracting work has recently been prepared by Downs Crane & Hoist Co., 540 W. Vernon Ave., Los Angeles

37, Calif. This booklet presents a full line of equipment designed for fast handling of heavy loads, pulling piling, lifting odd shapes, handling structural steel, etc.; plus rigging equipment; demolition hoods; and other useful contractor products. Detailed data, photographs, and specifications on this type of equipment are given, along with construction features, capacity ratings, and safety factors.

Bulletin 200B may be obtained from the company, or by using the Request Card at page 16. Circle No. 118.

New Portable Crane

A new portable wheel crane that operates off its own power and can be towed behind any truck, Jeep, or tractor has been announced by the Construction Machinery Co., Box 120, Waterloo, Iowa. The new model Han-D-Crane incorporates the counterbalancing features and Cradle Boom structural design of the original model, and is capable of lifting loads commensurate with the weight of the prime mover. The air-craft-type swivel-wheel mountings and rocker-arm trailer frame are designed to give maneuver-

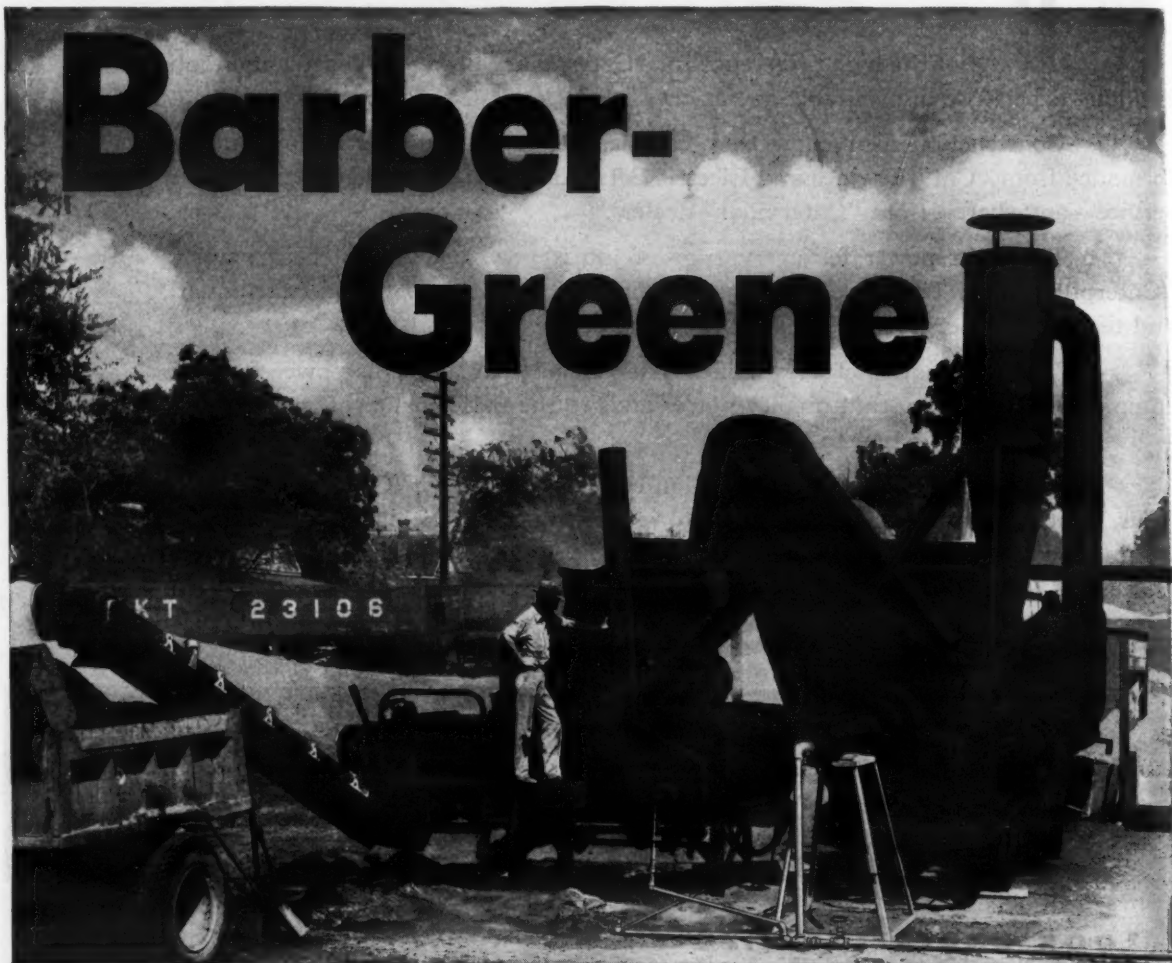


The new Han-D-Crane operates off its own power and can be towed behind any truck, Jeep, or tractor. Construction Machinery Co. makes it.

ability and smooth towing. Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 79.

ability and smooth towing.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 79.



This Small Bituminous Mixing Plant Does a BIG Job!

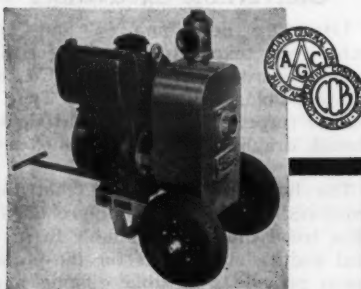
Here's a complete, easy-to-operate, small bituminous mixing plant! It is specifically designed for maintenance and repair work, small road building projects and a variety of other surfacing jobs. The B-G Maintenance Plant will handle any type of mix, and its capacity is remarkable, considering its size and portability.

The B-G Maintenance Plant is truly portable and easily erected. Small enough to operate at low cost on maintenance and general repair work,

Typical set-up of the Barber-Greene Maintenance Plant. Various combinations to meet your immediate needs may be easily arranged.

it is still large enough to handle small construction projects. It operates on the same principles as the larger Barber-Greene Central Plant, measures the correct amount of aggregate and bitumen, thoroughly mixes them and discharges the mix into trucks.

It consists of two basic units—the 840 Mixer and 830 Aggregate Dryer. Each unit is equipped with a towing hitch and pneumatic tires to trail smoothly behind your truck when going from job to job. A complete line of auxiliary equipment available including Reciprocating Feeder, Bins, Dust Collector, etc. For illustrative literature, write Barber-Greene Company, Aurora, Illinois.



NEW! a modern line of self priming-centrifugal CONTRACTORS PUMPS by **McGOWAN**

Here's the pump with high capacity at low operation speed for longer engine life. All-welded construction for lighter, stronger, more durable unit. Automatic priming—no moving parts or jets. Improved non-clogging impeller of special iron alloy. Hardened wear plate, for longer life. Fewer moving parts—hence less wear and lower maintenance cost. Large access plates—making inspection and repairs easier. Fully tested and trouble-free shaft seal.

All McGowan Pumps comply with contractors pump standards as adopted by the AGC. New Units—Rental Units. Repair Parts carried in stock by nation-wide dealers.

LEYMAN MANUFACTURING CORP., CINCINNATI 2, O.



Road-Mix Is Used On Relocation Job

**Heavy Grading Marks Road
Contract Some 2 Miles Long
On New Hampshire Route 12
In Town of Westmoreland**

BY plunging boldly into wooded and rocky hills on a new location, the New Hampshire State Highway Department has improved the alignment of its State Route 12 over a 2.6-mile section in the town of Westmoreland. A contract for this portion of the Monadnock Road, between Keene, N. H., and Bellows Falls, Vt., was awarded by the Highway Department to the Lambert Construction Co. of White River Junction, Vt., on its low bid of \$390,001.56. The project was completed last year.

The old road, dangerous because of its narrow width, sharp curves, and steep grades, had a 20-foot macadam pavement that was 20 years old. In general it followed the course of Mill Brook, a sharply twisting stream. Several channel changes have been made in the new route as the road alignment has been straightened and modified in profile.

The new bituminous road-mix pavement is 24 feet wide with a 3-inch center crown. Flanking 4-foot shoulders pitch 1 inch to the outside. The road-mix pavement is 3 inches thick and is cushioned on a gravel sub-base which extends out to the slope lines. The gravel varies in thickness, being 12 inches in fills, 18 inches in dirt cuts, and 21 inches in ledge cuts. In fills up to 7 feet high, the slopes are 4 to 1; over 7 feet they are 1½ to 1. In dirt cuts the slopes are 1½ to 1, and in ledge 1 to 2.

Excavation

The loose ledge rock was stripped off first in the roadway excavation work so that drilling could be started in the harder strata underneath. Two Thew-Lorain 1¾-yard shovels were the prime excavators in the hill cuts. Blast holes were drilled with three wagon drills—two Joy and one Chicago Pneumatic—which were driven by three air compressors—two Ingersoll-Rands at 315 cfm, and a Worthington at 210 cfm.



C. & E. M. Photo
In the wooded hills of Westmoreland, N.H., a Thew-Lorain shovel loads ledge rock to a Sterling truck with a 9-yard rock body.

Drill steel, 1¼ inches in diameter, in lengths of 6, 12, 18, and 24 feet, was employed with Timken bits either 2½ or 2¾ inches in size. Holes averaged 5 feet on centers both ways, and were charged with American 40 per cent

dynamite. As many as 1,500 holes were fired in a single blast. The ledge excavation, totaling around 40,000 yards, was mostly either schist or granite.

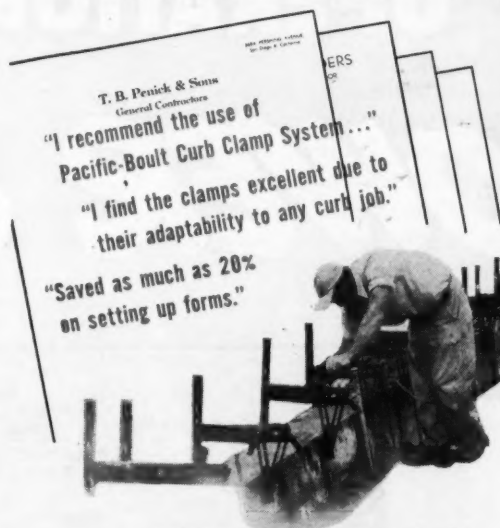
Material was hauled either in a pair of Athey 8-yard wagons pulled by Caterpillar DW10 tractors, or in a fleet of hired trucks. At one time as many as 15 trucks were on the job, with their capacities ranging from 4 to 9 yards a load.

Rock was placed in the fills in 2-foot layers, while the dirt, which was mostly clay and silt, was laid in lifts of from 6 to 12 inches. The deepest cut, occurring in the ledge rock, was 25 to 30 feet deep, while the highest fill on the job was 26 feet over a new arch bridge. When necessary the fills were wet down from a 1,500-gallon tank truck which was filled with water from nearby creeks. Compaction was achieved with a Bros sheepfoot roller pulled by an Allis-Chalmers HD-7 tractor. Two Caterpillar D8 tractor-dozers and a No. 12 motor grader were used to

(Concluded on next page)

"Performance-PLUS"

Report Contractors...



...with Pacific-Boult Clamps and Wood Forms

ENTHUSIASTIC RESPONSE from all contractors using the Pacific-Boult Clamps proves their economy, efficiency and speed in setting up low cost wood forms for curbs, curb and gutter, and battered curb. These contractors are glad to eliminate the cost of wood stakes and to reduce the amount of nailing required.

You too, can save on curb form costs by using Pacific-Boult Clamps because they are completely adjustable for all curb construction—adjustable for widths from 4 to 8"... for batter from vertical to any angle...in height up to 24". No stakes through the gutter are required in curb and gutter forms. No wrenches or special tools are required. There are no loose pieces or "extras."

Save money on curb form costs with Pacific-Boult Clamps; write for information and prices today! Ask, too, about the use of these clamps for setting up building foundation forms.

WHAT CONTRACTORS SAY:

T. B. PENICK & SONS, San Diego, California: "After having used the Pacific-Boult Curb Clamp System, I find the clamps are excellent for their adaptability to any type of batter, for combination curb and gutter, and also for straight curb work."

"We saved as much as 20% on setting up forms with your clamps. Since we salvaged almost all of the forms we expect the savings to be much greater with each future job."

"Your curb form clamps have proved themselves entirely satisfactory on several small jobs."

"I am well pleased with the Boult Clamp System after my first job."

PACIFIC ENGINEERING SALES CO.
215 WEST FIFTH STREET • LOS ANGELES 13, CALIFORNIA

**PACIFIC-BOULT
FORM CLAMP SYSTEM**

**Fastest SCAFFOLDING
Assembly Ever Devised**

Ezebilt

No Bolts
No Wing Nuts
No Loose Parts

For getting up faster... with no bolts to master, construction men the country over are now specifying Ezebilt Steel-Panel Scaffolding.

Write for New Illustrated Catalog or send for name of nearest distributor.

UNIVERSAL MFG. CORP.
123 North Street, Zellenople, Pa.

Road-Mix Is Used On Relocation Job

(Continued from preceding page)

spread and shape the material to grade.

Gravel Sub-Base and Road-Mix

Each shovel averaged about 1,000 yards of material in a 10-hour day on the roadway grading. Haul lengths ranged from 1,000 to 2,000 feet. Gravel for the sub-base was obtained from near-by pits which were excavated by the shovels. Trucks hauled the material to the roadbed where it was dumped and spread by the dozers and motor grader.

The sub-base was primed to a 26-foot width with RC-1 asphalt, in two shots of 0.5 and 0.25 gallon to the square yard respectively. The 3-inch course of road-mix pavement consists of gravel and 2 gallons per square yard of cut-back asphalt. Mixing was done by a Hetherington & Berner Moto-Paver.

Also included in the contract was the extension of a concrete arch bridge 105 feet upstream spanning Mill Brook. The structure is designed for H20-44 loading and has a span length of 19 feet 10 inches, with a 7-foot rise in the arch. The abutments are founded on ledge rock. Concrete for the bridge was delivered in truck-mixers from the ready-mix plant of Arthur Whitcomb Co. in Keene, N. H., a 10-mile haul from the job.

Quantities and Personnel

The major items in the 2.6-mile road contract included the following:

Earth excavation	48,000 cu. yds.
Ledge excavation	40,000 cu. yds.
Concrete (bridge)	500 cu. yds.
Gravel (base course and borrow)	40,000 cu. yds.
Reinforcing steel	40,768 lbs.
Channel excavation	12,000 cu. yds.
Ledge trench excavation	3,250 cu. yds.
Road-mix pavement	6,400 tons
Asphalt cut-back for pavement	35,000 gals.
Asphalt surface treatment	34,000 gals.

The Lambert Construction Co., Inc., employed an average force of 25 men on the contract under the direction of Mike Cerutti, Superintendent.

For the New Hampshire State Highway Department, Fred Hansen was engineer in charge of the project. The Department is headed by Gen. Frank D. Merrill, Commissioner, with John O. Morton, Chief Engineer. Robert H. Whitaker is Construction Engineer.

New Booster Clutch Reduces Job Fatigue

A new mechanical booster clutch that reduces lever pull on the Model 304 Koehring $\frac{3}{4}$ -yard excavator has been developed by Koehring Co., 3026 W. Concordia Ave., Milwaukee 16, Wis. Reduction in operating effort is made possible because the clutch is designed with two separate load-carrying clutch bands, one of which helps to set the other. It has been found that only about one-third to one-half the operating effort previously needed on a straight manual clutch is required on the new clutch, the company states. Other features claimed are increased production figures, simplified operation, and longer life for the excavator and its machinery parts.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 26.

Bottom-Dump Hauler With Engine Choice

For bottom-dump hauling, R. G. Le-Tourneau, Inc., Peoria, Ill., is now offering the Model E-16 Tournahopper powered by the C Roadster Tournapull prime mover available with a choice of three engines — GM-6-71, Cummins HRB-600, or the Buda 6-DC-844. Heaped capacity of the Tournahopper's 9-foot 2-inch square body is 16 tons or 15 cubic yards.



Choice of three engines is offered for the C Roadster Tournapull which powers the 15-cubic-yard Model E-16 Tournahopper. The rig has a turning radius of 14 feet.

Its self-cleaning bottom-dump doors operate in a manner similar to a clam-shell, swinging upward along the outside of the Tournahopper bowl as they open. Electric control permits con-

trolled ejection by opening the doors to any desired width, the company says. With the bowl doors opened, clearance is 22 inches; with bowl doors closed, 19 $\frac{3}{4}$ inches. The 90-degree left and

right turning angle gives the rig a turning radius of 14 feet. This, with multiple-disk air brakes on all four wheels and positive electric power steer, is designed to provide safe and easy positioning. Speeds range from 3.37 in first gear to 34.61 mph in fifth. The Tournahopper is equipped with 21 x 25 tires.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 1.

Eye and Face Protectors

A 28-page catalog on eye and face protectors for construction and industrial use has recently been offered by the Sellstrom Mfg. Co., 615 N. Aberdeen St., Chicago 22, Ill. Specifications, illustrations, and prices are given for a full line of goggles, helmets, hand shields, shields, windows, and accessories.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 104.

ASSURE *DEPENDABLE* OPERATION AT *LOWER COST*



TEXACO

Swing-Bar Extension For New Distributor

A line of bituminous distributors featuring full-circulating spraybars with new swing-bar safety extensions is announced by the Gunnison Mfg. Co., Baraboo, Wis. The units have front-end control for close coordination between operator and driver, and all working parts are kept away from the burners. The double burners have independent controls and fire into double return flues placed low in the bottom quarter of the tank.

The swing bars are at each end of the 7-foot center section. They can be carried on the highways since they swing back in a half circle; this saves them from damage if obstructions are hit. When swung back, the extension is closed and circulation occurs only in the center section. The spraybar and extensions on the Gunnison distributors are designed with a reverse suction which cleans the entire length. Either half of the bar may be shut off when



Swing-bar safety extensions mark Gunnison's new line of distributors in 800 to 3,000-gallon capacities, thus simplifying travel on the highway.

job conditions so require.

The new machines are available in 800, 1,000, 1,250, and 1,500-gallon capacities for truck mounting and 1,500, 1,750, 2,000, 2,500, and 3,000-gallon tanks for trailer mounting. Hydraulic controls are provided for most operations. The spraybars may be shifted

16 inches laterally and raised or lowered 12 inches by hydraulic controls. A hand spray, with nozzle and cold handles, is provided.

Further information on these bituminous distributors may be secured from the company. Or use the Request Card at page 16. Circle No. 132.

Use the TEXACO air compressor oil recommended for your operating conditions

No **ONE** oil can lubricate satisfactorily under all the conditions of air compressor operation. So Texaco has developed a *complete line* of air compressor oils. When used as recommended, you can be sure of dependable, top-efficiency operation and lower maintenance costs regardless of the type of compressor or the operating conditions.

Your Texaco Lubrication Engineer, for example, will recommend Texaco straight mineral oils for normal conditions . . . Texaco inhibited oils for rust prevention . . . Texaco special heavy-duty oils where service is severe and carbon and gum formations are problems . . . and Texaco compounded oils if excess moisture is present.

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assures free rings . . . clean valves and clear air lines . . . reduced wear for all moving parts . . . lower costs all around.

For longer drill life, and more footage drilled at lower cost, use *Texaco Rock Drill Lubricants EP*. These are "extreme pressure" lubricants designed to give full protection against wear and to guard against rust under the severest conditions.

Let a Texaco Lubrication Engineer help you simplify and improve your maintenance lubrication procedures. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Soil Stabilization Studies at Rutgers

Research studies on soil stabilization are being conducted by a group at Rutgers University College of Engineering, in cooperation with the New Jersey State Highway Department and the U.S. Bureau of Public Roads, to determine whether highway foundations or subsoils can be pre-settled and will remain so through years of constant use. Professor R. K. Bernhard, Chairman of the Committee on Soil Dynamics for the American Society for Testing Materials, directing this work, has developed a number of mechanical oscillators to facilitate the study of certain types of standing and propagation waves in the pavement or the subsoil.

The effect of these waves, first with respect to settlement or consolidation of soils, and second, with respect to failures caused by traffic vibrations in highway or air-field pavements, are of special interest. With the new machine, periodic impacts, in one or more planes simultaneously, may be excited to produce compaction effects in soils, particularly in soils with cohesive characteristics. The self-propelling characteristic of the oscillator is said to be of considerable advantage. It is expected that these studies will indicate which soils, either by themselves or in combination with others, will settle the least when vibrated by vehicles. Also the depth to which vehicle vibrations travel, and how far down highway builders will have to treat soil foundations at a particular location will be investigated.

The mechanical oscillators have additional value for performing tests on structural units. The induction of pure linear vibrations in structures, component parts, or endurance-testing machines is sometimes rather difficult due to eccentricities not often avoidable. These undesirable eccentricities may be caused, for example, by clamping devices. They can be neutralized by selecting the resulted force vector of the mechanical oscillator in such a form that its action line passes through the elastic center of the vibrating system or of the specimen to be tested.

Hard-Facing Handbook

A new and revised edition of the "Welder's Guide to Successful Hard-Facing" has been compiled by the engineering staff of Mir-O-Col Alloy Co., 312 N. Avenue 21, Los Angeles 31, Calif. Numerous changes have been made in this fourth edition to incorporate the latest data and instructions about hard-facing procedure, as well as new information about the company's line of hard-facing metals and their application in industry.

The literature discusses types of wear, types of hard-facing, applications, economies that can be obtained with hard-facing, and the effect of heat on metals. It treats both oxyacetylene and electric-arc processes. It also indicates which metals may be hard-faced and tells how to apply hard-facing to manganese steel and cast iron. A complete description is given for each of the Mir-O-Col hard-facing metals, as well as company recommendations for application on various equipment.

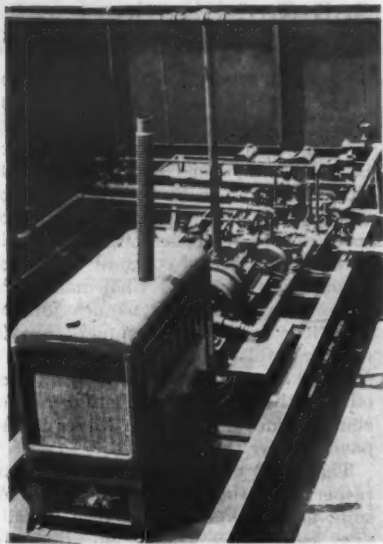
This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 120.

Atlas Promotes Russell

James R. Russell, who has been Explosives Sales Representative in San Francisco for Atlas Powder Co., Wilmington, Del., is now Special Representative in the company's New York District, Explosives Department. He will have special assignments throughout the district, which includes New England, New Jersey, and Delaware, as well as parts of Pennsylvania, Maryland, Virginia, and West Virginia.

Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT



McConaughay manufactures this portable plant for making asphalt emulsions on the job. The model shown here is diesel-driven and has a 3,000-gph capacity.

Emulsified Asphalt From Portable Plants

A new series of completely portable units for making asphalt emulsions on the job or at central stationary installations, has recently been announced by K. E. McConaughay of Lafayette, Ind. These complete plants are made in single units in capacities up to 2,000 gph and in multiple units for 3,000 to 6,000 gph. The feature of these units is the elimination of large storage tanks, since the emulsion can be made as needed and pumped directly into the distributor, tank-truck, or asphalt-mixer tank. The plants are complete with power

installation, emulsion mill, asphalt and water proportioning units, water treating units, supply and discharge pumps, asphalt barrel heater, and storage tanks. Diesel, gasoline, electric, or belt drives are available. Rubber-tired trailer and skid mountings may be obtained. A special single-unit plant with a capacity of 500 gph is completely mounted on a 4-wheel rubber-tired trailer for jobs requiring small mobile equipment.

Formulae to meet specifications of the AASHTO, The Asphalt Institute, and the ASTM are supplied with each plant. A complete plant-operating and emulsion-manufacturing manual in English, French, or Spanish is furnished. A compact field laboratory kit for running control tests of the aggregate, asphalts, and emulsions on the job is also provided.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 28.

Rubber-Base Paint For Highway Marking

A highway-marking paint with a synthetic-rubber base is being tested in Memphis, Tenn. The paint, making use of a high styrene-butadiene synthetic resin, Pliolite S-5, was furnished for the tests by the Chemical Division of The Goodyear Tire & Rubber Co., 1144 E. Market St., Akron 16, Ohio. It stripes both clean and dirty road surfaces of concrete, asphalt, and asphalt combination, Goodyear says.

Because the Pliolite resin is non-oxidizing, eliminating tendencies to "skin" or settle, the paint may be handled with a minimum of time and labor, according to the manufacturer. Its resistance to moisture and alkalis effects



Highway traffic-stripping paint which makes use of a synthetic-rubber resin, Goodyear's Pliolite S-5, was recently placed as a test on the streets of Memphis, Tenn.

a good initial adhesion. The resin's apparent insensitivity to weather at the time of application and its weathering resistance during exposure are expected

to contribute to long service life.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 33.

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Tampa Improves Its Water-Works Plant

New Boiler House Constructed, Pumping Station Enlarged To Serve Third-Largest City In Florida

THE city of Tampa, Florida, has embarked on a water-works improvement program to meet the demands of its fast-growing population. It is the third-largest metropolis of the state, exceeded only by Jacksonville and Miami, and according to the 1940 census, has a population of 108,391. Its metropolitan district numbers 209,693 persons. The city takes its water from the Hillsborough River which empties into Hillsborough Bay, an arm of Tampa Bay. Its Hillsborough River pumping station is located near the river bank in the northeast sector of the city.

About $\frac{3}{4}$ mile below this point, a dam in the river widens the waterway to provide storage capacity. It also raises the water head 20 feet, thus reducing the amount of pumping. At the station the water is treated and pumped into the city mains. An underground reservoir, holding 1,500,000 gallons, was built 5 years ago to store the treated water before it went into the pipes.

The plant itself is 25 years old, and the improvements now under way will increase its capacity from 15,000,000 gallons to 30,000,000 gallons per day. The filter plant was recently enlarged, and two accelerators were constructed under previous contracts.

New Boiler House

The major part of the project now under way involves the construction of a 52 x 78-foot boiler house adjoining the present boiler plant, and a 32 x 40-foot steel and concrete-block addition to the pump house. A new high head pump will be installed in this extension, and the present pumps are to be rebuilt. A contract for this work was awarded to Lewis & McDowell Co. of New York City at an estimated cost of \$265,000. A mechanical contract, covering the furnishing and installation of machinery and equipment for the improvement, went to Burford, Hall & Smith of Atlanta, Ga., for approximately \$1,168,000. A new 24 x 48-foot machine shop is also included in this phase of the work.

Two new Babcock & Wilcox boilers will be installed in the new boiler room. After they go into operation the original boilers will be dismantled, and the space that they occupied in the old boiler house will be used for storage. New fuel-oil tanks built by Chicago Bridge & Iron Co. to supply the oil-burning boilers have a capacity of 20,000 barrels.

Work on these contracts got under way in February, 1949, and the new part of the station is scheduled to be in operation by the early part of 1951. Robert & Co., Architects and Engineers, Atlanta, Ga., designed the structures, and is supervising the construction.

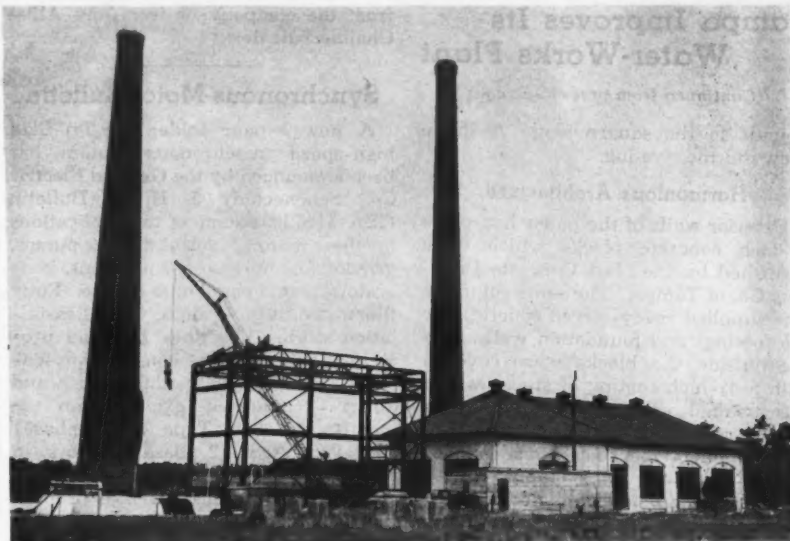
Steel and Concrete Construction

The 52 x 78-foot boiler house has a structural-steel framework which was fabricated by Bushnell-Lyons Iron Works and erected by the R. J. Gould Welding & Erecting Co., both of Tampa. There are 16 steel columns in the building, 6 along each side and 2 more at the ends: 12-inch WF beams, either 53 or 65-pound. They are supported on concrete footings 7 feet square x 15 inches deep, while a concrete foundation wall 13½ inches thick is built around the perimeter of the building. The foundation floor slab is a 5-inch course of reinforced concrete with the finished elevation at 28.0.

The roof is hipped, and thus has only 4 trusses. These are Howe type, 6 feet deep, and are 50 feet 2 inches long measured between the center lines of the columns. They are placed on 19-foot 8-inch centers, with the end trusses 8 feet 7 inches back from the columns at the ends of the building. Roof purlins are 10-inch WF 21-pound beams.

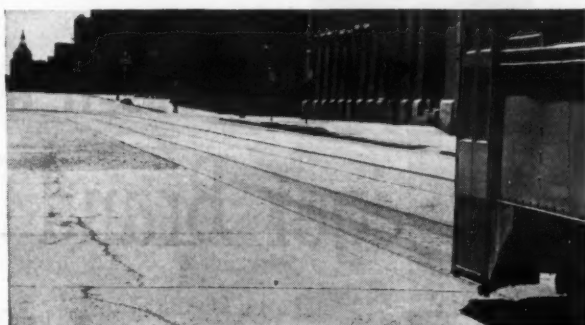
The steel was delivered to the job by truck, and lifted into position by a Koehring crane equipped with a 70-foot boom and an 18-foot jib. Members were bolted into place, and later riveted together with $\frac{3}{4}$ -inch rivets; gusset plates are $\frac{3}{8}$ inch thick. The roof live load is figured at 25 pounds to the square foot, and the wind load at 40

(Concluded on next page)



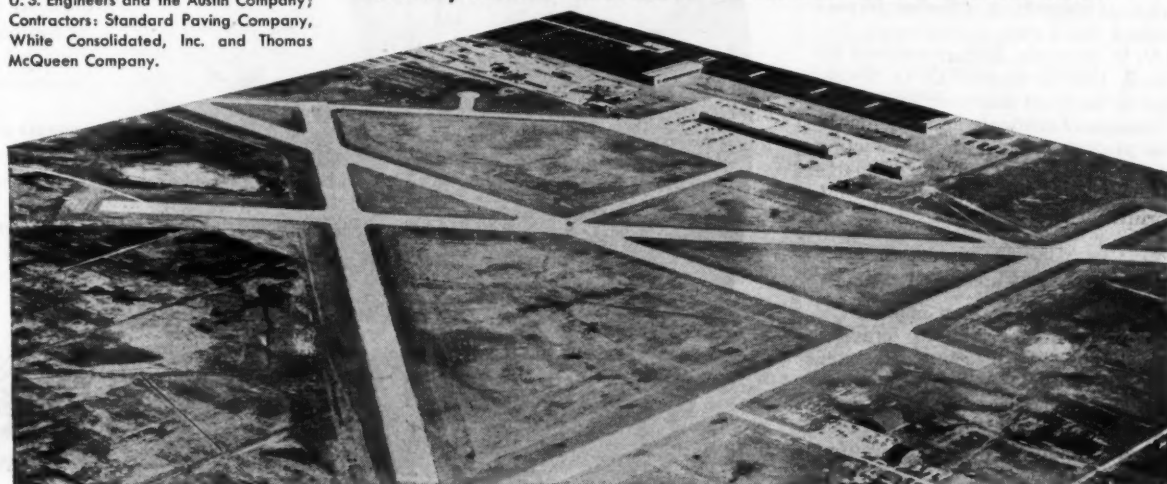
C. & E. M. Photo

A Koehring crane lifts steel to the top of the new boiler house for the Tampa pumping station. The 125-foot smoke stack at the left replaces the old 155-foot one at the right, which is to be razed.



For example: O'Hare Field (formerly Douglas Airport), Park Ridge, Ill. Duraplastic used exclusively. Placed 1942-43. Despite heavy traffic of war and peace...and the rigors of seven tough winters...paving remains durable and highly scale-resistant. Designed and supervised by U. S. Engineers and the Austin Company; Contractors: Standard Paving Company, White Consolidated, Inc. and Thomas McQueen Company.

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*"Duraplastic" is the registered trade mark of the air-entraining portland cement manufactured by Universal Atlas Cement Company.

CE-D-101

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Tampa Improves Its Water-Works Plant

(Continued from preceding page)

pounds to the square foot. A single crew did the riveting.

Harmonious Architecture

Exterior walls of the boiler house are 12-inch concrete blocks which were furnished by the Hart Concrete Products Co. of Tampa. The same company also supplied ready-mixed concrete for the footings and foundation walls. On the outside the blocks were covered with a 3/4-inch coating of stucco which was painted yellow to conform with the other structures at the plant. The flat portion of the roof is made up of precast-concrete slabs topped with built-up roofing material. Red Spanish tile was laid on the sloping portions of the roof to harmonize with like architectural treatment of the other buildings. A 10 x 50-foot ventilator is built into the slab roof of the boiler room.

From the 28.0 elevation of the floor slab there is a 38-foot vertical clearance to the bottom of the roof trusses. At elevation 44.29 a platform was built for the feed-water heater, having a 16-foot 3 1/2-inch clearance from the floor. Higher up, with an 18-foot 6-inch vertical clearance above this first platform, is a second platform at elevation 62.79 to support the surge tank. The walls are 40 feet 1-9/16 inch high measured from the finished floor.

An interesting feature of the job was the construction of a 125-foot-high brick smoke stack for the new boiler house. This was done under a subcontract by the Rust Engineering Co. of Pittsburgh, Pa. From a 20-foot diameter at the base, the stack tapers to 5-foot diameter at the top. It replaced the original 155-foot smoke stack, also of brick, which was subsequently razed.

Personnel

Representatives of the two prime contractors on the water works improvement were L. A. Chatlos, Superintendent for Lewis & McDowell Co., and V. T. Scroggin, Superintendent for Burford, Hall & Smith. C. G. Trowbridge is Resident Engineer for Robert & Company, Architects and Engineers.

The project is under the jurisdiction of the city of Tampa, Water Department, which is headed by J. S. Long, Superintendent.

Tractor Service Manual

A new 287-page service manual for the Allis-Chalmers HD-19 crawler tractor equipped with torque converter has recently been issued by the company's Tractor Division Service Dept., Box 512, Milwaukee, Wis. It includes a complete guide for proper operation, maintenance, and repair. Separated into 23 sections, the book gives a general description of the tractor, complete specifications, and a detailed pictorial and written description of its various assemblies as well as instructions for their adjustment and repair.

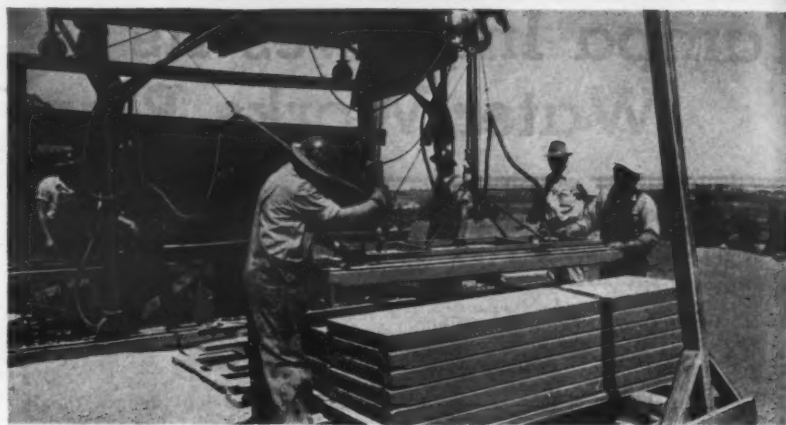
Copies of the HD-19 tractor service manual may be obtained for \$5.00 each

from the company or from any Allis-Chalmers dealer.

Synchronous-Motor Bulletin

A new 8-page folder on Tri-Clad high-speed synchronous motors has been announced by the General Electric Co., Schenectady 5, N. Y. Bulletin GEA-5426 lists some of the applications for these motors, such as driving pumps, grinders, compressors, saws, fans, generators, conveyors, mixers, etc. Fully illustrated, it gives three typical installation stories, describes Tri-Clad protection, and discusses construction features, mechanical modifications, and direct - connected exciters for the motors. It covers Type TS (3-phase) and Type QS (2-phase) motors in ratings from 20 to 1,500 hp at 60-cycle speeds of 1,800 rpm, as well as proportional horsepower ratings for speeds through 514 rpm.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 58.



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"All-Year Highway" Finished by Kiewit

Sub-Base and Plant-Mix Top Grade Previously Prepared by Other Contractors Over 22-Mile Road Relocation

By **RAYMOND P. DAY**,
Western Editor

(Photo on page 1)

★ SOUTHWESTERN Wyoming's famed "All-Year Highway", U. S. 30, has a new 22.3-mile piece of finished construction which will add to the year-round reputation of this scenic route. Located between Lyman and Granger Junction, the new section is on a completely new location, eliminating all the obsolete alignment and other objectionable features of the older road. Construction work which topped a previously built subgrade, was done by Peter Kiewit Sons Co. of Omaha.

The contract called for the production and placement of a 5-inch blanket of 2-inch granular material, a top sub-base course of 1-inch aggregate from 1½ to 3 inches thick, and a 2-inch surface of plant-mixed asphaltic concrete. The contract was typical of a Kiewit project, because it featured good equipment and excellent organization and progress.

The subgrade of the new section was under construction over a year. Eleven miles were completed by J. J. Dooling, and the remainder was done under a contract with Gibbons & Reed, general contractor of Salt Lake City.

Laid through sagebrush-covered rangeland, with some badland dunes, the project traverses a high plateau nearly 7,000 feet above sea level. It is a land rich with history. Fort Bridger, where famous Indian Scout Jim Bridger held forth, is near the west end of the project. Not far to the east is Green River, where intrepid boatmen of the early 1800's jumped off to brave the Green and Colorado Rivers as they traveled to where Hoover Dam now stands.

Is Wide, Safe Highway

The new project is one of the most modern in all the state. Its plant-mixed surface is 24 feet wide, with gravel shoulders from 8 to 10 feet wide beyond the pavement edge. The shoulders blend gracefully into Wyoming's famous "streamline" construction design, which ordinarily will clear itself of a great deal of snow. The in-slopes and cut slopes are gentle, some as flat as 10 to 1, and despite some heavy cuts there is an enormous amount of "daylight" to combat the snow and make the sight distance better, especially where cuts are on easy curves.

The contract was signed on April 20, and work got under way by May 1, with a 140-work-day limit.

The project called for extensive quantities of material. There were 118,000 tons of 2-inch maximum size stone; 51,200 tons of 1-inch topping; 2,800 tons of stone chips for the armor coat; 1,216,000 ton-miles of haul on

plant-mix; 1,990 tons of 150 to 200-penetration asphaltic cement; and smaller quantities of MC prime and RC seal-coat material.

All of the construction materials in the job topped out previous work, which included in addition to the earth subgrade some 4 inches of pit-run gravel and from 4 to 14 inches of native blow sand, which was laid and processed on top of the compacted earth.

Two Major Moves on Job

The work was located in such a way that a natural combination of distance and material supply practically dictated a 2-move construction sequence. The crusher and screening plant first

(Continued on next page)



C. & E. M. Photo

Hot Plant Superintendent Bill Cummins and Erection Engineer Don Palmer of Pioneer talk over a point in setting up the hot-mix plant for Kiewit's Wyoming project.

ANNOUNCING THE NEW **DOMOR** ELEVATING GRADER...

**to give more jobs to your
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Here's a new job-proven tool that can add more cost-cutting jobs to the duties of the "Caterpillar" Motor Grader.

It's the new DoMor Elevating Grader that quickly gives your No. 12 or No. 112 Motor Grader the ability to cast, load or terrace with speed and economy. The grader is easily converted from blade to elevating work and back again.

If you're looking for a way to lower costs, see your nearby DoMor-"Caterpillar" Dealer for a convincing demonstration of the DoMor's amazing production capacity and economy!

Here are a few of the
DoMor features:

- ✓ Strong welded box section plow beam.
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- ✓ 42" belt running 400 feet per minute handles maximum production.
- ✓ 4-ply corrugated top conveyor belt.
- ✓ Auger-type pan cleaner.
- ✓ Operation controlled by regular grader controls.
- ✓ Plus a score of others that your DoMor-"Caterpillar" Dealer is anxious to tell you about.



600 cu. yds. an hour were "cast" by this DoMor-"Caterpillar" team working on a township road. The same high production capacity is put to work, at left, loading berm trimmings.

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ROANOKE, ILLINOIS

"All-Year Highway" Finished by Kiewit

(Continued from preceding page)

worked in a pit about 3 miles in from the east end of the project. From this point all crushed aggregate for a third of the sub-base was produced and laid. While the plant was set up in this pit, the aggregates for the hot-mix were also made and stockpiled, as were the cover chips. This set-up was good for about one-third of the total project distance, on the east end.

The crushing-screening plant then moved to a new pit near the western end of the project, only 7 miles east of Lyman. From this point it repeated its production performance, making aggregates for the remaining two-thirds of the highway. When it had approached the finish of its work, a new asphalt plant had arrived and was being set up in the first pit to produce the hot-mix for the easterly third of the project.

A second move by the hot-mix plant brought it to the western pit, where the remaining asphaltic-concrete tonnage was then produced and laid.

Even the water sources were similarly located. There is a small river near the west end, where trucks could pick up the moisture which was needed for processing the rock. Several springs near the eastern end furnished the moisture for that end of the project. The eastern pit was close to a river, which furnished steam for the hot plant. The contractor's headquarters office was in the town of Lyman, Wyo. This location was selected principally because the company also had a few other small assignments in that general locality.

A New Crushing Plant

New equipment was conspicuous over the project. This included the rock production pit, where a new Cedarapids Master tandem portable crusher turned out a flood of crushed rock 16 hours a day.

Two Caterpillar D8's with Caterpillar dozer blades fed the machine. They also stripped sagebrush, topsoil, and scrub desert growth, and stockpiled some of the hot-mix material and chips which were used later. By using a large-size Pioneer trap and feeder to furnish raw material to the plant, the cats often got time to strip sagebrush and do other odd jobs, especially when the plant was producing hot-mix aggregates and fine armor chips. A trap full of rock ran the Cedarapids plant about 13 minutes when it was on armor-rock production. This gave a tractor time to do many of the other odd jobs so necessary around a pit.

The Pioneer feeder is adjustable over a wide volumetric range. It fed the pit-run material to a belt conveyor 50 feet long, which transported and raised it to the top of the big portable plant.

The material dropped to a vibrating platform, which fed it to the upper tier of double-deck vibrating screens. For the production of 2-inch material, the top deck was equally divided between 3-inch and 2½-inch mesh, with the 3-inch openings located on the distant end of the screen, in reference to the platform. The upper deck was covered with 2-inch and 1½-inch mesh, in the same order, when the plant was producing 1-inch-maximum material for the hot-mix.

Pit-run rock retained on the 3-inch scalping deck passed into a 1036 jaw, which broke it down and discharged it over a conveyor to the lower deck of the vibrating screens. This deck was covered entirely with 2-inch mesh for the production of 2-inch-minus stone, and with ¾-inch mesh for the smaller plant-mix material.

Everything which passed through this lower deck went directly to the 35-ton surge bin, where the material

was transferred to the hauling trucks. Material retained on the 2-inch lower deck was routed through a 40 x 22 roll crusher, set at a narrow clearance so theoretically there were no pieces larger than the maximum permissible size. Throughs from the roll crusher passed once again to the lower deck and out the stacker belt to the surge bin.

The plant was so set up as to make the jaw crusher do an optimum share of the work. This reduced wear, expense, and welding on the rolls, but even so, a welder had to work about 5 hours each night putting Abrasoweld rod on the roll surfaces, especially where they cup in toward the center.

The entire Cedarapids crushing plant is run by power from a Caterpillar D17000 V-type diesel engine, which drives the main shaft by means of a multiple V-belt hook-up, with heavy outboard bearings to resist shaft torque.

In both plant set-ups, a haul road was bulldozed straight through under

the surge bin, so that trucks could drive under without having to back up. A fleet of at least 20 assorted rented trucks carried the material out to the highway. On close-haul work they were paid on a flat-fee guarantee basis, while on longer hauls they were paid by the ton-mile.

The rock was not too hard, all things considered, and only about 25 per cent of the pit required crushing when 2-inch material was produced. It was quite abrasive, however, and crusher and screen wear were so steady as to be a constant source of preventive maintenance work.

Processing the Rock

The grade previously made was left reasonably smooth and ready for the granular sub-base. As the Kiewit trucks arrived on the fill, they end-dumped their loads, usually on a quarter point, and strung the material out according to a distance established by the state man who dumped the loads. Each load had of course been weighed

before it left the crushing plant, and the driver had a ticket, which he transferred to the dump man.

Sections from 3,000 feet to a mile long were processed at a time. This was done with motor graders, by the road-mix method. The dumped material was first knocked down by a pass of the blade. Following close behind was a 2,500-gallon tank mounted on a Chevrolet truck. It put the moisture in the material a little at a time.

The crushed rock was not loaded up with too much moisture. Only enough was used to make the material a little sticky while it was being mixed. "Just so long as the fines are covered so they'll bind well, we're satisfied," said Chief Inspector W. G. Ainsley.

After the material had obtained its moisture content, it was mixed by several passes of the two Caterpillar No. 12 motor graders, and then laid down. The 5-inch course of 2-inch material was put down in two 2½-inch lifts, and the fine top course was placed

(Concluded on next page)

ONE Grease for ALL



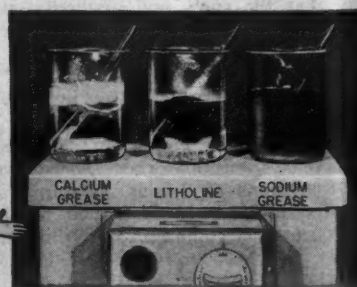
**"Yes—One Grease,
One Gun and
A Better Job too!"**

Here is a versatile grease that can be used with absolute confidence wherever lubrication is needed—chassis, wheel bearings, water pumps, universal joints, etc., in winter or summer—under all kinds of operating conditions.

**These 4 Severe tests prove
SINCLAIR LITHOLINE
is better than any single grease!**

SCENE: Sinclair's Research Laboratories, Harvey, Ill.

CAST: Two commonly-used greases of highest quality; a calcium soap chassis lubricant and a sodium soap wheel bearing grease; and Sinclair's Litholine.



WATER RESISTANCE TEST!

Samples of each grease are heated in beakers of water. Near boiling, the sodium grease disintegrates into soapy water and oil. Shortly after boiling the calcium grease shows foamy emulsion as grease absorbs excess water. Litholine remains unaffected, proves its superiority in combating wet conditions.

SINCLAIR REFINING

in one lift.

An International rubber-tired tractor with a pneumatic roller heavily ballasted with wet sand was used to give the rock its compaction. The project was set up for about 20 roller hours to the mile, which was usually sufficient to cover the surface several times.

The granular sub-base was finished, to survey blue-tops in an effort to put it exactly "on the money" so no further work would be necessary before laying the plant-mix. The top of the sub-base was primed with 0.5 gallon of MC-2 per square yard, and the road when primed was open to such construction traffic as normally used that highway. This traffic consisted of a few pick-ups, state survey cars, and so on. The main transcontinental traffic used the existing old highway until the new one was finished.

A New Asphalt Plant

A new hot-mix asphalt plant, purchased new, was used to mix the many tons of plant-mix which cover the

primed sub-base. The plant was a new Pioneer Continuflo, and it is believed that its drier is the largest in use on a portable plant. The entire equipment is mounted on rubber tires, and dismounts in three main pieces with a maximum road height and width dimension of 12½ feet.

The new plant, sparkling with the red enamel of the factory, was in the process of being erected when this magazine visited the project. It was being set up in the first pit, just a short distance from Granger, and near the river which furnished water to the boiler.

The boiler is a new Cleaver-Brooks 125-hp steam generator, which delivers steam automatically, at 150 pounds of pressure, as it is needed. Electric automatic controls control the fuel feed to the burners, and the fire performs more accurately than if a man were there to adjust the controls. No. 2 fuel oil was used in this machine, which heated the asphalt tanks, atomized No. 5 fuel in the drier burner, and heated all the

steam jacketing surrounding the many asphalt lines around the plant.

The asphalt circulated continuously from horizontal storage tanks past the 750-gallon insulated asphalt tank at the pugmill. Two men were able to operate the plant with less effort than many a crew twice that large currently spends on older ones.

The mineral aggregate, made previously by the crushing plant, was fed to the asphalt plant by a Pioneer 30-inch mechanical feeder. This feeder delivered the rock at variable volumes to a 24-inch x 50-foot portable conveyor, mounted on a hydraulic truck. This conveyor dumped the rock into the drier.

The single drier, 90 inches in diameter x 24 feet long, is huge. It is friction-driven through two driving trunnions by a General Motors 3031 diesel engine, rated at 65 hp. A Ray air-atomizing steam-turbine-driven burner produces flame at approximately 2,200 degrees F, which roars through the drier to heat and dry the aggregate.

From the drier outlet, the aggregate passes into a 22-foot-high totally enclosed hot bucket elevator, which hoists it up to the 4 x 12, 2½-deck sizing screens. The plant has a built-in Bristol remote indicating pyrometer, which measures the temperature of the aggregate as it tumbles down out of the drier. This temperature was not expected to exceed 250 to 260 degrees.

Since the mix for this project was only a 2-bin pull, the half deck was removed from the vibrating screens. The top deck was covered with ¾-inch mesh, and the lower deck by No. 4 cloth. After being sized, the aggregate dropped down into the 20-cubic-yard-capacity surge bins contained in the Continuflo plant.

A 36-inch 3-compartment plate feeder with calibrated gates to proportion the feed of material measures out material and puts it on a short elevator. The elevator raises the batch to the twin 8-foot pugmill, which does the mixing. Driven by a General Motors 6031 diesel engine, rated at 130 hp, the pugmill also has a special anti-caking shell which is reported to have worked successfully on a similar plant purchased by the Kiewit organization about a year ago.

The plant is equipped with a Yale & Towne variable-volume positive-discharge pump, which is mechanically interlocked with the aggregate feed. Thus the new plant, set to hair-trigger accuracy, will produce a mix about as precise as the engineers will design it.

Of especial interest to the men who operated the new equipment was the fact that it was clean. A special dust collector, driven by a 43-hp General Motors diesel, contains a 25,000-cfm fan and two 20-5 Western Precipitation Multiclone units. Dust separated from the hot air passing up the stack can then be returned to the hot elevator by means of a 9 x 30½-inch screw conveyor.

Should the material contain too many fines in some pit in the future, some of the tubes can be removed from the Multiclone units to permit some of the material to escape out the stack.

The plant began to work by August 1, and rolled the plant-mix material out at a steady peak rate. The laydown machine was a Barber-Greene Finisher.

The project might have posed some problems under other circumstances, but the combination of well trained men, good machines, and an experienced force of state highway inspectors under Oliver Baldwin, Project Engineer, assured the success of the undertaking and made it a "routine" affair.

Personnel

Known by its Federal-Aid number of FI-219 (5), the new section was designed and work was directed generally by J. R. Bromley, Superintendent of the Wyoming Highway Department, with Talcott Moore as Construction Engineer. The work was under the direction of Dan Bell, District Manager of the Kiewit Co. at Denver, Colo., and Bob Turpen, Superintendent. Melvin Babcock had charge of field work on the project, assisted by Bill Cummins, operator of the hot plant, and T. W. Starnier, operator of the crusher.

Data on Wire-Rope Blocks

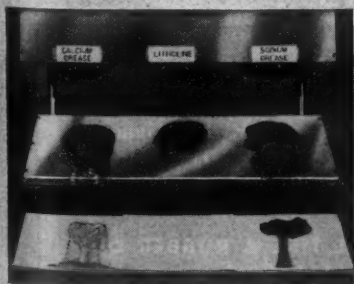
Section I of Catalog 19, describing Durolite all-steel wire-rope blocks, has recently been made available by Sauerman Bros., Inc., 548 S. Clinton St., Chicago, Ill. This 10-page folder points out that the Durolite blocks are manufactured with either bronze or roller bearings and in both single and multiple-sheave types. The single-sheave blocks, which come in many sizes, are made with two different designs of side frames—straight throat and wide throat. The catalog fully describes and illustrates the different types and lists the sizes available.

Lubrication Jobs!

LOOK WHAT ONE-GREASE—ONE-GUN LUBRICATION MEANS TO YOU...



- 1 Superior protective lubrication
- 2 No danger of misapplication
- 3 Less chance for contamination
- 4 Reduced time-out for lubrication and maintenance
- 5 Fewer servicing man-hours
- 6 Less wastage
- 7 Fewer dispensing units
- 8 Smaller grease inventories
- 9 Simplified purchasing and distribution
- 10 A finer grease at every lubrication point



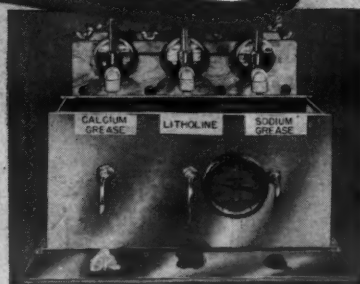
HEAT-RESISTANCE TEST!

The samples are heated on a plate. At 190°F., the calcium grease disintegrates. At 340-350°F., the sodium soap structure collapses and releases the oil. Bearing failures would follow. At 380°F., Litholine shows no effects, proves superior for high temperature lubrication jobs.



MECHANICAL STABILITY TEST!

Worked (kneaded) samples are placed beside samples of unworked grease. Steel balls are dropped. Distance ball sinks in worked samples shows increase in softness—loss of stability. The calcium grease showed greatest increase in penetration, the sodium grease next. Litholine showed no difference whatever... proving its superior mechanical stability in service.



LOW TEMPERATURE PUMPABILITY TEST!

Lever-type grease guns are filled with chassis greases and cooled. At 20°F., it is impossible to pump the sodium grease. At 0°F., it is impossible to pump the calcium grease. But Litholine still pumps in good volume! Yet Litholine is a heavier (harder) grease. Thus, Litholine has the body for summer service yet is pumpable in severely low temperatures.

COMPANY

For lubrication counsel, or more information on Litholine, see your nearest Supplier of Sinclair Products, or write to Sinclair Refining Company, 630 Fifth Avenue, New York 20, New York.



Sliding cones double the length of feed on the new mountings for Thor drifter rock drills. The largest model has a total extension of 96 inches.

Drifter-Drill Mounts

Three new power-feed mountings for the Thor drifter rock drills have been announced by Independent Pneumatic Tool Co., Sales Promotion Department, 175 State Street, Aurora, Ill. They are all designed for use with Thor Models 82 and 92 drifter rock drills, and are equipped with sliding cones, which automatically double the length of feed. Largest of the new line is the Model RF-96 which has a total extension of 96 inches—48 by means of the power feed and 48 by means of the sliding cone. An aluminum shell decreases the weight of the large-size mounting. Models RF-48 and RF-60, also equipped with the sliding cone, provide feeds of 48 to 60 inches.

All three models are powered by air motors which give power-feed operation with a minimum of vibration, the company says. An exclusive rotor and blade construction gives positive and slow-starting torque. Throttle valve and handles are conveniently located.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 60.

Rebuilding Worn Equipment

Literature which describes high-speed welding for repairing, rebuilding, and preventing wear on heavy-duty parts and machines is available from Resisto-Loy Co., producer of hard-facings, Grand Rapids 7, Mich. Two of the folders prepared by the company are of particular interest to contractors, dredgers, and quarry men. They are Bulletin No. 7, which explains the company's Two-Tone arc process, and a 4-page folder offering a guide to hard-facing selection for almost every piece of equipment used in the construction industry.

The bulletins detail the features and mode of application of wear-resistant

surfaces; list Resisto-Loy alloys, rod sizes, and prices; illustrate applications with before-and-after photographs; and point out physical data and welding characteristics of the different products.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 133.

New Utility Building

A new utility building is being added to the Quonset line fabricated by the Great Lakes Steel Corp., Stran-Steel Division, Ecorse, Detroit 29, Mich. This new steel arch-rib structure, the Quonset 24 Special, is styled with one straight side and has an inside width of 24 feet. Its length may be any number of 12-foot-long units.

N-A-X Hi-Tensile alloy steel is used for principal support members. Framing design incorporating this steel minimizes construction material and labor, the company says. N-A-X is also corrosion resistant. The steel members with which the 24 Special is framed have the



Latest of the Quonset utility buildings, the 24 Special has an inside width of 24-foot-long units. Notice the one straight side.

patented Stran-Steel nailing groove. Nails driven into this groove are deformed and clinched with a steel grip said to be tighter than that of ordinary building materials. A time-saver in erecting the building, this feature also

makes it possible to fasten interior lining materials to the steel framework as simply as to wood, the company says.

Further information may be secured from the company. Or use the Request Card on page 16. Circle No. 143.

OVER SHARP ROCKS, MUD, GRAVEL, SAND... OUT AND OVER THE HIGHWAYS

GENERALS
do all jobs

better, safer, faster
at Lower Cost

THE GENERAL L.C.M.

THE GENERAL H.C.T.

For more profit in every on and off-the-road job depend on this dual-purpose General Truck Tire team. The General L.C.M. for most work off-the-road. The General H.C.T. for most work on-the-road.

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The General L.C.M.—heavy tread legs resist cutting, prevent slipping and sliding in tough off-the-road work.



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General tractor treaders with maximum traction from high, long-wearing, self-cleaning tread ribs. No side slip.

THE "Quinn Standard"
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The Quinn Standard is known as the best the world over, wherever concrete pipe is produced and used. Backed by over 35 years' service in the hands of hundreds of Quinn-educated contractors, municipal departments and pipe manufacturers who know from experience that Quinn pipe forms and Quinn mixing formulas combine to produce the finest concrete pipe at lowest cost.

Quinn Heavy Duty Pipe Forms
For making pipe by hand methods by either the wet or semi-dry processes. Built to give more years of service—sizes for pipe from 10" up to 120" and larger—tongue and groove or bell end pipe at lowest cost.

WRITE TODAY. Complete information, prices, and estimates sent on request. Also manufacturers.

QUINN CONCRETE PIPE MACHINES

QUINN WARE, IRON WORKS, JAMES H. BOON, JR.

Harbor Is Deepened At Georgetown, S. C.

**Channel Depth Increased
From 18 to 27 Feet MLW;
Two Hydraulic Dredges on
6,604,600-Yard Project**

THE historic harbor of Georgetown, S. C., is being deepened under the direction of the Department of the Army, Corps of Engineers, Charleston District, to provide a 27-foot channel at mean low water. The previous dredged depth of 18 feet was completed in 1937. Total length of the improvement is 18 miles, extending from a 27-foot depth in the Atlantic Ocean, through the waters of land-locked Winyah Bay, to the Sampit River and the docks of old Georgetown.

Removal of the additional 9 feet of bottom was started in June, 1947. The major portion of the dredging, however, did not get under way until December, 1948, after the Corps of Engineers awarded a contract to the Atlantic, Gulf & Pacific Co. of New York City. This contract will involve the removal of some 6,729,000 cubic yards of material from the channel bottom at a cost of approximately \$2,075,000. Part of this work has been subcontracted to the Standard Dredging Co., also of New York. A. G. & P. Co. employed its new 27-inch hydraulic dredge Barlow on the Georgetown contract. A similar-size craft, Lake Fithian, is working for Standard. The project as of September 1, 1949, was 75 percent complete and is expected to be completed during 1950.

Contract in Three Parts

The big dredging contract was divided into three parts. Part 1 is at the head of navigation in the Sampit River at Georgetown; it is 10,218 feet long, and entailed the excavation of 2,308,600 cubic yards. A hairpin curve in the river was eliminated in this upper section by cutting a channel through dry land inside the loop; two turning basins, 800 and 600 feet wide respectively, in the vicinity of the docks were also included. The channel itself is 400 feet wide, the same as before, but the bends are widened. This portion of the project was completed on May 30, 1949.

Part 2 continues downstream for 14,700 feet through Upper Winyah Bay, and involved the dredging of 1,864,800 cubic yards; this part was completed on June 20, 1949. Then a section that was completed in 1948 is skipped until Part 3 is reached which is 16,900 feet long. The dredging here totals 2,555,900 yards. These last two parts also have bottom widths of 400 feet. Part 3 is known as the Lower Eastern Channel, and the channel beyond that leading into the entrance channel is called the Gorge. The Atlantic, Gulf & Pacific Co. completed dredging the Gorge Channel to 27-foot depth for a 600-foot width on August 12, 1949. This work was advertised subsequent to the award of the initial contract. The Gorge Channel is approximately 3 miles long, and the work involved the removal of 599,200 cubic yards of material at a cost of approximately \$159,000.

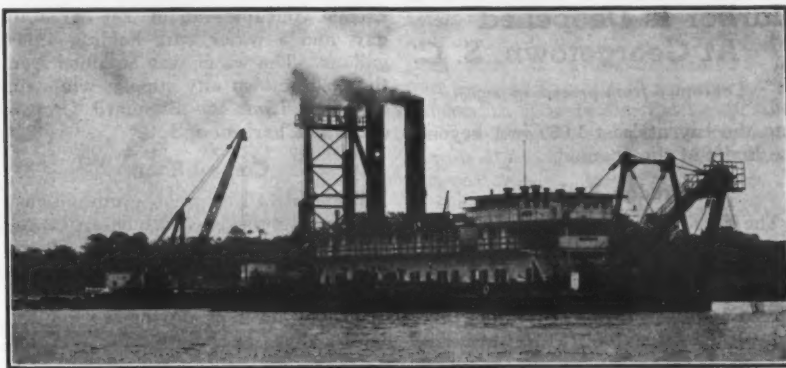
The entrance channel, which extends from the 27-foot contour in the ocean for about 2¼ miles into Winyah Bay, was partially deepened by the Corps of Engineers, and in this section the channel is 600 feet wide. The Federal government hopper dredges Lyman and Hyde made a pilot cut in this area, 200 feet wide and 25 feet deep. This work was completed on July 8, 1949. A larger government hopper dredge is scheduled to complete the channel to full depth and width during 1950. Both contractor dredges have worked in Part 1, while

the A. G. & P. Co. did all of Part 2, and let the Standard Dredging Co. take care of all of Part 3.

Hard Digging Material

The toughest dredging material was encountered in Parts 1 and 3. In removing 9 feet of bottom, from 18 to 27 feet MLW, the last 2 feet usually turned out to be either limestone or marl underneath a layer of mud and clay. The channel in the Part 1 area is close in to the docks and buildings of the Georgetown water front; thus any blasting was eliminated. Both dredges used rock cutters at the heads of their intake lines. Blasting was resorted to in Part 3, which lies in the outer bay.

Material dredged from this section was disposed of in three spoil areas



C. & E. M. Photo

The dredge Barlow of the A. G. & P. Co. is a new steam dredge built by the Elliott Machine Corp. It is 184 feet long, 44 feet in beam, and has a 14-foot hull depth.

along the Sampit River. In one of these marsh areas, dikes up to 18 feet high first had to be constructed to retain the hydraulic fill. In the other two sections, the ground was high enough for the fill to be placed and the water to drain off without the use of the retaining levees. The maximum length of

pipe line required in this part was 6,000 feet, but the average line was only about half that, with most of the length going into shore pipe.

In working the other two parts of the contract, the dredges simply ran out a floating line and discharged material (Continued on next page)

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6-WHEELERS
WILL DO YOUR
JOB BETTER!

Federal Tandem Units are available for your hauling job with gross vehicle ratings from 27,500 lbs. up to maximum load limits.

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Where the going is tough . . . where unmatched load hauling ability, pulling capacity and economical operation really count . . . put Federal Six Wheelers on the job. Federal's balanced engineering design assures an abundance of economical power when needed without over-stressing load-carrying components. This reduces maintenance to a minimum—keeps trucks on the job longer. Add to these: the unusual strength and stamina built into Federal frames; heavy duty, long lasting brakes; easy steering; rugged, modern designed tandem axles and many other money saving Federal features and you can readily appreciate why Federal Six Wheelers mean bigger and more profitable payloads. See your Federal Dealer today.

FEDERAL MOTOR TRUCK COMPANY, DETROIT 9, MICHIGAN



Federals Have Won . . . By costing less to run!



Harbor Is Deepened At Georgetown, S. C.

(Continued from preceding page)

into the bay at least 1,000 feet beyond the limits of the channel.

Dredge Barlow

The Barlow of the A. G. & P. Co. is a new dredge built by the Ellicott Machine Corp. of Baltimore, Md., on an all-steel hull laid by the Bethlehem Steel Co. at its yard in Sparrows Point, Md. It is 184 feet long, 44 feet in beam, and has a 14-foot hull depth; the plates are either $\frac{1}{2}$ or $\frac{3}{4}$ inch thick with $\frac{3}{4}$ -inch plates on deck. A 34-foot A-frame at the bow supports a 120-ton all-welded ladder, 94 feet long, which can dredge to a depth of 60 feet. The galleys frame is 36 feet 6 inches above the level of the deck. In wells outside the hull at the stern are the two spuds, 17 feet apart on centers. Each is 65 feet long, 34 inches in diameter of steel shell, and weighs 20 tons. The dredge may dig with either spud down, since the discharge line leaves the Barlow at the center line between the spuds.

The three decks of the craft—main, quarter, and top—are painted a two-tone gray; inside, the paint is white. The two tall smokestack funnels are black, while such gear as capstans, niggerheads, ladders, etc., are a bright yellow so they cannot be missed and stumbled over. Well aft, occupying two levels from the ship's hold up through the main deck, are two Foster Wheeler A-type steam generators. Each boiler is fired by 5 Todd oil burners and has 8,056 square feet of heating surface; each supplies 37,500 pounds of steam per hour under normal load. The boilers carry a 330-psi steam pressure under normal operation, but can go up to 400 pounds.

Forward of the boilers is the turbine room housing three Elliott steam turbines. The main unit, of 4,270 hp at 3,600 rpm, drives only the dredging pump at 270-320 rpm through an 11 to 1 reduction gear. The second turbine runs an 885-kw generator which provides electric power for the operation of the cutter-head motor and the winding-gear motor, both Elliotts. The cutter-head motor—400 hp at 900 rpm—turns the cutter head through a reduction gear at 31 rpm. The winding-gear motor is rated at 200 hp. The third turbine operates a 380-kw generator for light and auxiliary power.

Rock Cutter Head

Hung from the ladder is the 32-inch-diameter intake line and a driveshaft at the end of which is a 6-foot-diameter spider-type cutter head. This rock cutter has 32 teeth of hard steel which are 29½ inches long and 4½ inches in diameter at the greatest girth. As the teeth wear down they are continually replaced; at times in hard digging, teeth may last only 2 hours before they are removed. Three shifts of welders were used in building up points on the teeth that had worn down.

The intake pipe enters the dredge through an 18-foot-long flexible rubber sleeve, and then continues to the 27-inch pump with which either a 78-inch or 96-inch impeller is used. Above the pump hangs an electric hoist to lift off the manhole lid in the line for the removal of stumps, etc. before they reach the pump itself. The 27-inch discharge line leaves the pump on the starboard side, runs back along the deck to the stern, and then turns to leave the dredge at the center between the spuds.

Around the pump well are various machine-shop tools for maintenance work, including a Western radial drill, Steptoe shaper, U. S. grinder and buffer, and a Nebel lathe. A fully equipped blacksmith shop is located in the stern deck house, aft of the boilers. In the hold are tanks for 1,200 barrels of bunker C fuel oil, of which the

dredge consumes about 200 barrels a day, and a water tank holding 48,000 gallons. The water was obtained from the Georgetown city supply, while the oil came from the Standard Oil Co. docks in Charleston, S. C.

Control Room

The control room or operator's house overlooking the bow is modern in design and equipment. Instead of the customary long levers for the operator to pull on, small hand switches controlled by air now do the work. The depth gage is before him on the A-frame, and the spud heights are registered on an indicator. The vacuum gage registers from 10 to 26 inches, the low readings showing up in hard digging. Discharge pressures vary from 50 to 65 pounds. Other equipment includes a ship-to-shore telephone, and the usual telephone line out over the pipe line to the shore crew.

Because of the hard nature of the dredging, no great progress in yardage excavated was possible. The Barlow's

best 24-hour day was 40,000 yards, but on that particular day little hard material was encountered. The per cent of solids pumped also varied greatly from 1 to a maximum of 15 per cent.

On the winding gear of A. G. & P. Co.'s own design the Barlow has 550 feet of 1½-inch swinging wire, but it made two swings in cutting the 400-foot channel. The swing gears, one on each side of center, are slightly forward of the spud drums on either side of the ladder wheel. The two swing anchors weigh 4 tons each.

Floating Line

The pontoon line consisted of 38-foot lengths of 27-inch pipe connected with ball joints. Each length of pipe was supported on two 52-inch-diameter steel cylinders with cone ends; the cylinders were tied together with 12 x 12 strongbacks. The pontoon line was securely moored with 20 anchors, each weighing 1,250 pounds. Where an elbow occurred, two 3,000-pound anchors were put out. The line was placed so

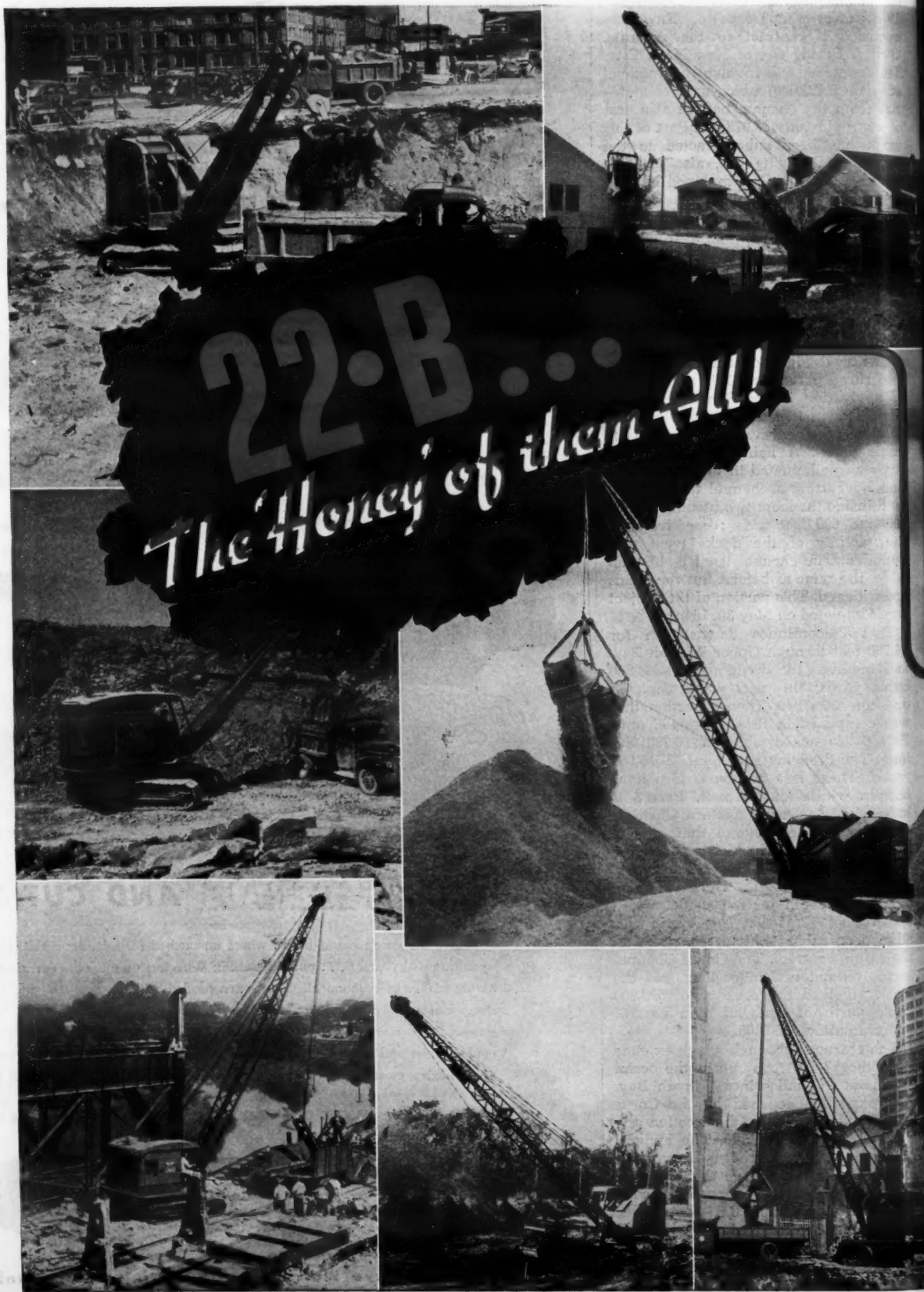
that it seldom had to be broken for navigation. On land the pipe line was made up of 16-foot lengths secured with slip joints.

A. G. & P. Co. floating equipment included tow tugs—the Minnie S., 53 feet long x 14 feet wide with a 7-foot hull, and powered by a Fairbanks-Morse 150-hp diesel engine; and the Augie, 33 feet long x 11 feet wide and 5 feet in depth. The latter has a General Motors 100-hp diesel engine.

The swing anchors were shifted about and other heavy work was handled by a steel derrick barge, 75 x 32 x 6 feet, with an 8-ton lift. Bunker C fuel oil was brought to the Barlow in a steel barge, 100 x 30 x 9 feet, with a capacity of 3,300 barrels. The 75,000-gallon water barge measured 92 x 26 x 7 feet. Pipe sections were stored on a steel work barge, 110 x 30 x 7½ feet.

The Barlow had a crew averaging 110, and worked 24 hours a day, 6 days a week. An average of 30 were engaged shifting pipe on the land line.

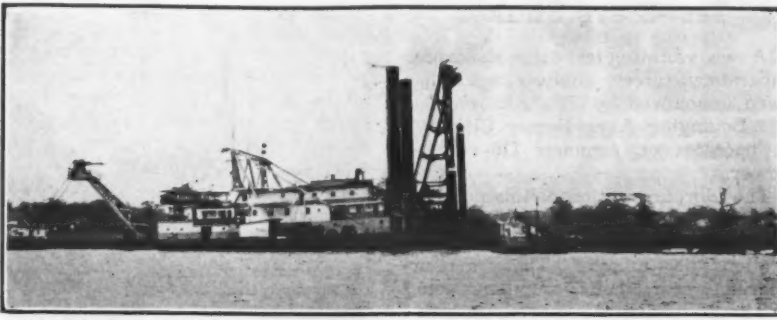
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Personnel for the A. G. & P. Co. includes Captain Miles E. McLeod, Superintendent, and Henry A. Benson, Assistant Superintendent and Civil Engineer. Captain Olie Syvertsen is Master of the Barlow, and H. T. Farmer is Chief Engineer.

Lake Fithian

The Lake Fithian of the Standard Dredging Co. is a former Great Lakes steamer that was built in 1919 and converted into a hydraulic dredge in 1926. Its steel hull is 150 feet long, 43 feet wide, and 13½ feet deep. The power plant consists of four Foster Wheeler boilers, each fired by 2 Todd oil burners, and operating on 220 pounds of steam. The steam drives an Elliott 4,000-hp main turbine which powers the dredge pump through an 11 to 1 reduction at 325 rpm. A second turbine, a DeLaval 1,800-hp unit, runs a generator that supplies current for a 200-hp swing motor and a 700-hp cutter-head motor. There is an auxiliary 150-hp diesel generator for light and power.



C. & E. M. Photo

Standard Dredging Co. used its dredge Lake Fithian at Georgetown Harbor. Formerly a Great Lakes steamer, it was converted into a hydraulic dredge in 1926.

The winding gear is Bucyrus-Erie, with the two swing drums in front, and the two spud and the big ladder drums slightly to the rear. At the bow, the 84-foot ladder can dredge to 52 feet. The ladder supports the 34-inch suction intake line and the 6½-foot cutter head which has 6 arms, with 7 teeth on each arm, for rock work. In tough digging, cutter heads are changed as

much as three times a day. With the screw-type shaft the change can be made in 25 minutes. Welders then build up the worn-off teeth.

The 27-inch pump has an 86-inch impeller, and averages 15 inches of vacuum, with from 65 to 70 pounds of pressure on the discharge line. The 27-inch discharge pipe leaves the pump on the port side, and continues within

the deck housing to the stern where the spuds are placed in wells outside the hull. The spuds are a 2-inch-thick steel shell, 39 inches in diameter, 76 feet long, and weigh 40 tons each. A blacksmith shop is also located on the stern deck, while an adequate machine shop is in the hold forward of the main pump.

Auxiliary Equipment

For a pontoon line Standard uses 48-foot sections of 27-inch pipe connected with Mobile Pulley 6-bolt joints. Each length of pipe floats on two tanks, 54 inches in diameter x 36 feet in length, joined by 10 x 12-inch strongbacks 36 feet long. The 16-foot land pipe sections are connected by telescopic joints.

Auxiliary floating equipment includes 3 tugs—the 63-foot Carolina, the 48-foot Barber, and the 48-foot Suzanne. The first two are powered by Atlas Imperial diesel engines, 340 and 120 hp respectively, while the Suzanne has a Fairbanks-Morse 120-hp diesel engine. Other craft are a 60 x 28 x 4-foot derrick barge; a 240 x 48-foot equipment and work barge; a 2,400-barrel oil barge; and a 10,000-gallon water barge. The Lake Fithian burns around 300 barrels of bunker C fuel oil a day, supplied by the Standard Oil Co.

Personnel includes 65 men on the dredge crew, and 45 on land, setting and shifting pipe. C. B. Clarke, Jr. is Superintendent for Standard, while Captain Sam J. Goodrich is Master of the Lake Fithian, and C. S. Abrigo is Chief Engineer.

The Charleston District, Corps of Engineers, is headed by Lt. Col. J. B. Lampert, District Engineer. Price J. Padgett and John D. Payne were Inspectors aboard the Barlow and Lake Fithian respectively.

Multi-Purpose Hose

A new Vari-Purpose hose has recently been developed by the Carlyle Rubber Co., Inc., 64 Park Place, New York 7, N. Y. This hose, the company says, is designed to handle air, water, oil, grease, paint, gases, solvents, and many other liquids. The new Vari-Purpose hose has a specially compounded tube to resist reactions of various elements, a braided Du Pont Cordura rayon carcass, and an oil and abrasive-resistant cover. It is flexible, and light in weight.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 14.

Dewatering Operations

A newly compiled 36-page catalog on equipment and methods for handling subsurface water has been prepared by Complete Machinery & Equipment Co., Inc., 36-40 Eleventh St., Long Island City 6, N. Y. It is designed for use by engineers, general contractors, and job superintendents who plan to drain construction sites with wellpoint equipment.

The literature points out that the company is the originator and patentee of the fluted-tube wellpoint. Its star-shaped construction, designed for rigidity and strength, provides 8-inch drainage surface on a 2-inch cross section. The catalog includes a full discussion of wellpoints, drawings of various types, a complete set of instructions for installation, and field photographs of large and small dewatering operations.

The wellpoint, the catalog points out, uses only 2 gages of screen for straining underground water to prevent clogging. It explains that the floating-ball type of check valve in the check head permits water to leave at the tip of the jet head during jetting, yet seals the head when water is drawn into the system.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 20.

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BUCYRUS-ERIE



This new vibratory test-sieve shaker made by Syntrol handles six 8-inch sieves for laboratory analysis.

Test-Sieve Shaker

A new vibrating test-sieve shaker for laboratory screen analysis work has been announced by The Syntrol Co., 227 Lexington Ave., Homer City, Pa. It operates on common 110-volt ac power.

The vibrating action of this portable shaker is produced by the Syntrol electromagnet drive, at a rate of 3,600 vibrations per minute. There are no bearings, gears, belts, or pulleys, etc., and no lubrication is required, the company points out. Amplitude of vibration is regulated by a rheostat. The unit holds six 8-inch-diameter sieves.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 11.

New Diesel Series

Increased-horsepower improved-performance diesel power units and automotive engines of the 4-cylinder International 9 Series are now available in new UD-9A models, according to the Industrial Power Division, International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill. Design changes have been made in both the UD-9A automotive engine for motor graders and other self-propelled machines and in the UD-9A power unit for stationary installations.

New features include a redesigned precombustion chamber and piston, the A Series I.H. fuel-injection pump, simplified injection nozzles, counterbalanced crankshaft, and new connecting rods. Compression ratio has been increased to 15.7 to 1. The UD-9A power unit delivers 62.5 hp at 1,600 rpm under intermittent load. It is available with job-designed equipment which fit it for specialized industry applications. Weight of the UD-9A power unit is 2,060 pounds; dimensions in inches are 67 3/4 long, 28 1/16 wide, 52 high.

The UD-9A automotive engine operates at governed 1,800 rpm delivering 70 hp at that speed. Dimensions are 41 1/2 inches long, 24 inches wide, and 42 1/2 inches high, without air cleaner. Engine weight is 1,500 pounds.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 61.

Two New Earth-Movers

Two new additions to its line of earth-moving equipment have been announced by LaPlant-Choate Mfg. Co., Inc., 2930 First Ave., Cedar Rapids, Iowa. First, the TS-200 motor scraper, a self-propelled rubber-tired earth-mover of 9 to 12-yard capacity. Powered by a 145-hp Buda diesel engine, it has a top speed of 23.44 mph with standard transmission. With optional transmission, top speed is increased to 27.4 mph, the company says. Ease and safety of operation are provided by double-acting hydraulic steering and large four-wheel air brakes. The unit is equipped with 21.00 x 25 tires, 20-ply. Scraper action is hydraulically controlled.

The second unit is the TW-300 motor wagon, which is powered by a 225-hp



The new LaPlant-Choate TS-200 motor scraper has a 9 to 12-yard capacity and a top speed of 23.44 mph. The scraper is hydraulically controlled.

Buda supercharged diesel and has a top speed of 21.2 mph. Its capacity is 14 yards struck and 19 yards heaped. Doors are hydraulically controlled. Standard 24-ply tires are 24.00 x 29. The wagon tractor is the same one

that is used with the TS-300.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 50 for information about the scraper and No. 51 for the wagon.

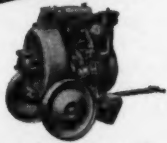
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Latest type 2" and 3": Compact heavy duty units with weather-shielded engines.



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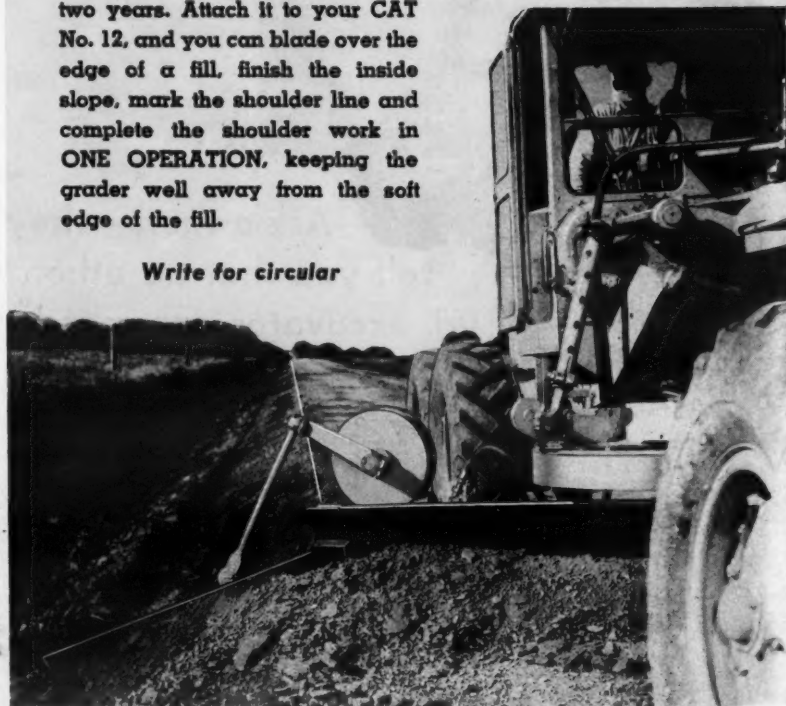
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INDIANOLA
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Small forms and tight places are meat to the 1-hp electric Mid-Jet vibrator.

Hand-Model Vibrator For Small-Form Work

A new electric hand-model concrete vibrator has recently been developed by the Dart Mfg. & Sales Co., 1246 Champa St., Denver 2, Colo. The Mid-Jet is especially designed for work in small forms and in tight places around heavy steel reinforcing. It can be used with either the Dart 1½-inch vibrating head or the Model L-10 1½-inch head for the smallest form work. The complete unit with a 6-foot shaft and head weighs 32 pounds. It is equipped with the patented Dart helixed eccentric vibrator head, an adjustable shoulder strap, and a grip-fit handle into which a button-control trigger lock is built so that the operator may lock it in the "on" position if desired. A 1 hp motor operates the unit.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 39.

Masonry Protection

Heretofore a restricted product, Hydroban, a water-repellent masonry-surface preserver, is now generally available, according to an announcement by Hydroban, Inc., 15 Exchange Place, Jersey City 2, N. J. The product is a transparent, liquid, organic, chemical compound for protecting most porous materials used in building construction, both inside and out. Being a very thin liquid, it can be easily applied by brush or by spray, and requires no special skill or knowledge for effective application. It may be applied at temperatures between 40 and 100 degrees F.

Hydroban comes ready for use without mixing and should never be diluted, according to the manufacturer. The finished surface is said to keep out moisture and thereby prevent cracking, chipping, and surface breakage. According to the manufacturer, Hydroban hardens surfaces and renders them easier to clean; it will not mar or change colored surfaces or leave a white bloom on brick and masonry. The liquid is available in containers.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 52.

Simplified Tax Deduction

The Federal government has recently approved a simplified method of figuring payroll tax deductions; it has authorized employers to use a withholding table which combines the income tax and employee's Federal Insurance Contribution Act tax.

A chart book which combines the deductions has recently been offered by the Delbridge Calculating Systems, Inc., 2502 Sutton Ave., St. Louis 17, Mo. It shows the amount of the new 1½ per cent social security deduction, the amount of income tax to be withheld, and the combined amount of the two tax deductions. It also shows the special 15 per cent deductions and the daily and miscellaneous payroll period deductions, from 1 to 7 days, as direct an-

swers without the use of multiplication or division. This system is said to cut payroll tax-computing time in half.

The chart book may be obtained from the company at a price of \$7.50 for the weekly, semi-weekly, and semi-monthly payroll periods or \$10 for the monthly payroll period.

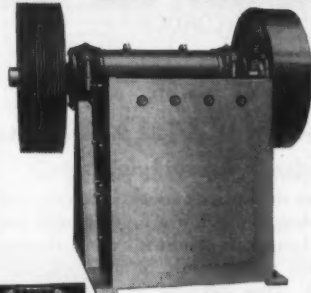
Information on Jacks

Specifications and application information on mechanical and hydraulic jacks are included in a new catalog recently issued by Templeton, Kenly & Co., 1020 S. Central Ave., Chicago, Ill. The 32-page folder, designated Catalog No. 50, carries full details of the 123 models of ratchet-lowering, hydraulic, and screw-type jacks that comprise the standard Simplex line. The jacks are grouped by type and combined with a quick identification of each jack's major uses.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 115.

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Model	Moto-Cranes	Self-Propelled
Standard Track Carriers	Model MC-254	Model SP-254
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Highway Application Of Seismic Technique

Portable Seismographic Equipment
Offers a New Tool to Reduce Work
And Cost of Highway Soil Surveys

By MICHAEL A. SPRONCK,
Associate Editor

SEISMIC techniques can provide a valuable engineering tool for determining soil profiles and subsurface soil and bedrock conditions. This fact was pointed up recently when engineers, geologists, and seismologists gathered informally to watch a demonstration of a new portable refraction seismograph.

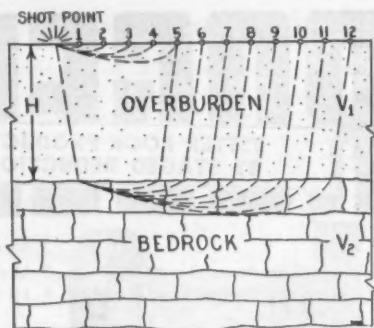
The group, guests of the Bureau of Soil Mechanics of the New York State Department of Public Works at Albany, spent the morning in a shirtsleeve discussion of seismographic equipment—its construction, operation, and application in the field for on-site determinations of soil conditions. In the afternoon they witnessed a demonstration of the most recent development in equipment, a rugged, compact, portable seismic unit designed by Century Geophysical Corp., of Tulsa, Okla., specifically for soil engineering uses.

The test was conducted by Rev. Daniel Linehan, S. J., Director of Weston Observatory. George W. McAlpin, Principal Soils Engineer, and Paul H. Bird, Senior Engineering Geologist, of the Bureau, arranged for the meeting and provided a test site where previously driven wells could be used to check the demonstration results.

The Seismic Method

The morning discussion centered on three spheres of interest: the seismic method, its application in engineering, and the new pilot model.

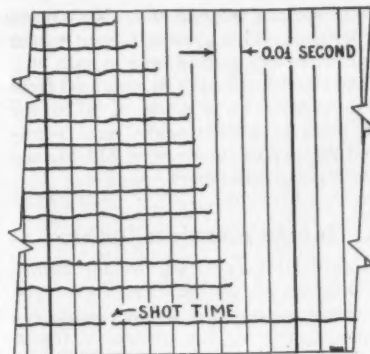
The seismic method for determining soil characteristics—thickness of overburden, depth to bedrock, strata elevations, geological formations, water table in some cases, compactness, strength, etc.—is based on the measurement of the time for the advance of a wave front usually generated by exploding a small charge of dynamite. This measurement is made by timing the arrival of the wave at geophones placed on line, set distances away from the



1. Diagrammatic view of seismic method.

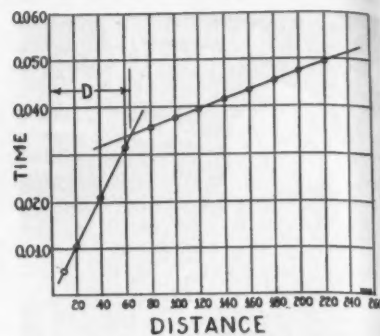
firing position or "shot point".

These detectors are simply coils, suspended in a magnetic field, which emit a small current when vibrated through the field as a result of a shock-wave arrival. This impulse is amplified and transmitted to a galvanometer in the oscillograph. The amplified current causes the galvanometer to rotate, deflecting a beam of light that is projected onto a mirror set in the galvanometer.



2. Oscillogram, record of shock arrivals.

So long as there is no current, the light causes a simple straight line to be formed on a strip of sensitized photographic paper that travels at right angles to the beam. The arrival of current, however, twists the mirror and instantly throws the beam off the paper, resulting in a sharp break in the line. This break measures the time of arrival of the shock wave at each pick-up point,

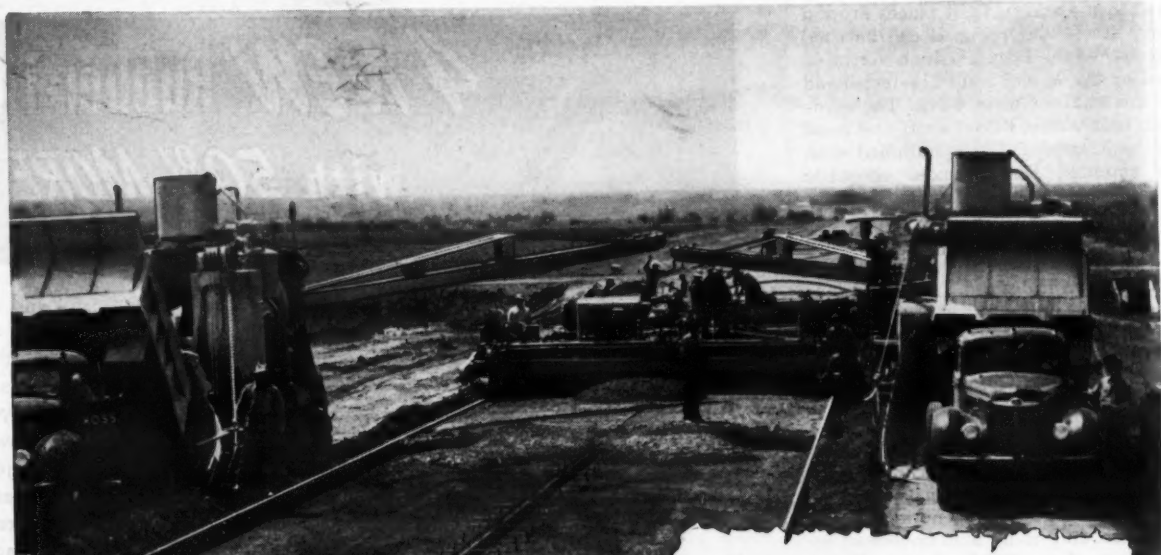


3. Graph of time-distance curve.

since both the instant of detonation and the break point for each detector are indicated by timing lines which are projected synchronously on the photographic paper.

A typical set-up, with detectors placed in progression at predetermined intervals away from the shot point, is illustrated in Figure 1. When the charge is fired, energy waves radiate in all

(Continued on next page)



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ON 22 miles of U. S. Route 81 in Kansas, these two GM Diesel-powered Koehring 34-E Twin-batch pavers were used by Koss Construction Company of Des Moines. They poured 2800 feet of 22-foot pavement in one 10-hour run. Slab was uniform 9-inch thickness, mesh reinforced.

In another period of 4 consecutive days, their crews paved 2 full miles. They completed the entire 285,000-sq.-yd., 22-mile paving project in 12 calendar weeks.

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A recent study released by the Bureau of Public Roads reveals wide differences in the cost of building concrete pavement.

Kansas, Texas and Michigan costs were lowest. Because of the difference in thickness of pavements in various parts of the nation, the comparison of construction costs was made on the basis of a square yard one inch in thickness.

The cost varied from 36.1c per sq. yd. 1 in. in thickness in Kansas to \$1.076 in Nevada. Michigan's cost was 36.8c. The national average cost is 42.1c. In Illinois the cost is 48c; Ohio 44.7; Pennsylvania 51c; Indiana 45.3c; Wisconsin 43.6c; and Kentucky 56.2c.

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directions. Their line of center to each geophone is indicated by a dashed line. The direct wave reaches the detectors nearest the shot point immediately through the low-velocity overburden because of the short travel path. As the wave front progresses downward, it reaches bedrock. This change in media causes some of the energy to be refracted along and through the bedrock. Because of the higher velocity of propagation in the denser medium, the travel time is greatly accelerated; as a result, the refracted wave soon overtakes and passes the direct wave. It may be noted in the figure that this occurs between stations 4 and 5. Until this time, all that has been recorded is the travel time of the wave through the overburden. Now that the refracted wave has passed the horizontal wave, stations 5 through 12 will record the wave refracted from the bedrock, the first arrival. The later arrival of the direct wave usually can not be read from the record.

Figure 2 represents an actual oscillogram, or record. The vertical lines are for timing and each division is 0.01 second. The heavy horizontal lines are the galvanometer traces. When the wave front arrives at the various stations, it is recorded instantaneously and shows as a break in the continuity of the galvanometer trace. The traces still continue, but they are of such amplitude that they cannot be seen on the record for approximately 0.5 second.

The record is developed and the "first arrivals" are measured in thousandths of a second from the "time break". These times are then plotted on graph paper (preferably linear graph paper with 1-mm and 1-cm divisions) to form a time-distance curve, as illustrated in Figure 3. With this curve, the velocities of both the overburden and the bedrock can be accurately determined by the slope of the curve d versus t , where d is the distance between any two stations and t is the time difference in arrival. Also, the point where the refracted wave overtakes the horizontal wave may easily be located. This is commonly referred to as the "point of intersection" or "critical point", and is measured in feet from the shot point. When these factors are known, the thickness of the overburden or depth to bedrock may be determined by the formula

$$H = \frac{D}{2} \sqrt{\frac{V_2 - V_1}{V_2 + V_1}}$$

where H is depth to bedrock in feet; D is distance to point of intersection in feet; V_1 is the velocity of the bedrock in feet per second; and V_2 is the velocity of the overburden in feet per second.

Highway and Other Applications

The many uses for this technique can be described only briefly. Paramount, however, in the application of the seismic method is the need for a seismologist or geologist, or both, to interpret the data and correlate them with other findings. The simplified example presented here does not represent all the vagaries of widely different geological formations—a dip in bedrock, weathered faults, varying water contents of porous soils, and other conditions which require that the seismic findings, accurate in themselves, be interpreted by men experienced in evaluating the readings and soil-characteristic indications.

Use of the seismographic method offers three advantages in soil surveys: a saving in time and cost, and the ability to obtain data in areas inaccessible to drills. Father Linehan explains that in open terrain, a seismologist and a party of three can cover ten 220-foot profiles and their reversals (a sound checking method) in a day. This includes driving the shot holes, tying in the location, mapping profile elevations, and making field readings of the records. This may be done considerably faster and at less cost than core drilling. In more difficult terrain, the number of

profiles decreases, but drilling methods would be equally difficult. The portable seismographic equipment can be used in terrain that is forested, mountainous, swampy, or inaccessible to drill equipment. Lack of water needed for drilling, or difficulty in obtaining it, is no problem to the seismic crew.

The principal application, of course, is in the determination of depth to bedrock. These data are usually required at locations of cuts of 10 feet or more, sites of important structures, and in clay or swampy areas. Used in preliminary location work, the method will indicate where a road might be shifted to avoid heavy ledge cuts. If other controlling features preclude the shift, it is possible to make an accurate estimate of the quality and area of the ledge.

The method has also been used to determine broadly the engineering characteristics of overburden. Father Linehan finds the following figures applicable at times but points to the particular difficulty in the 5,000-fps range:

Velocity in FPS	Material
1,000 to 2,000	dry loam, some aeolian deposits
1,500 to 3,000	dry sands, loose till, etc.
3,500 to 5,500	compact tills, gravels within the water table, etc.; some clays
5,000	varved clays in Connecticut River Valley
6,000 to 8,500	hardpan, compact older tills, etc.; some shales and rotten rock
12,000 and above	bedrock

A velocity of 6,000 fps, he says, suggests good bearing; one below 5,000 fps suggests that other tests are needed for determination of bearing capacity. A

velocity below 6,000 fps certainly indicates easy excavation. Some states are using the seismic method in conjunction with other methods to make detailed geological maps of the state—often in order to determine all available sources of highway construction materials.

Borings made in glacial till are sometimes misleading, due to the presence of large boulders mistaken for bedrock.

(Concluded on next page)

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Chevrolet P-L Truck performance consists of many things. There is Chevrolet design—brilliant and functional—design with a purpose. There is Chevrolet construction—sturdy and dependable—for lasting usefulness.

And there is Chevrolet power—power to deliver the goods—more power than Chevrolet trucks ever had before. Two great valve-in-head engines—the Load-Master 105 h.p. and the Thrift-Master 92 h.p.—make these the most powerful Chevrolet trucks ever built.

These new P-L models are far ahead in features, too; yet they cost surprisingly little to buy, to operate, to maintain. And that adds up to value—the kind of outstanding value that year after year makes Chevrolet America's fastest selling truck.

CHEVROLET MOTOR DIVISION, General Motors Corporation, DETROIT 2, MICH.

LEADING WITH ALL THESE PLUS FEATURES:

- TWO GREAT VALVE-IN-HEAD ENGINES: the New 105-h.p. Load-Master and the Improved 92-h.p. Thrift-Master—to give you greater power per gallon, lower cost per load
- THE NEW POWER-JET CARBURETOR: smoother, quicker acceleration response
- DIAPHRAGM SPRING CLUTCH for easy action engagement
- SYNCHROMESH TRANSMISSIONS for fast, smooth shifting
- HYPOID REAR AXLES—5 times more durable than spiral bevel type
- DOUBLE-ARTICULATED BRAKES—for complete driver control
- WIDE-BASE WHEELS for increased tire mileage
- ADVANCE-DESIGN STYLING with the "Cab that Breathes"
- BALL-TYPE STEERING for easier handling
- UNIT-DESIGN BODIES—precision built.

CHEVROLET P*L

ADVANCE-DESIGN TRUCKS

P*Popularity Leaders

Chevrolet trucks outsell all others. In every postwar year truck users have bought more Chevrolets than any other make—proof of the owner satisfaction they have earned throughout the years.

P*Performance Leaders

The new Chevrolet P-L trucks give you high pulling power over a wide range of usable road speeds—and on the straightaway, high acceleration to cut down total trip time.

P*Payload Leaders

The rugged construction and all-around economy of Chevrolet P-L trucks cut operating and repair costs—let you deliver the goods with real reductions in cost per ton per mile.

P*Price Leaders

From low selling price to high resale value, you're money ahead with Chevrolet trucks. Chevrolet's rock-bottom initial cost—outstandingly low cost of operation and upkeep—and high trade-in value, all add up to the lowest price for you.



Highway Application Of Seismic Technique

(Continued from preceding page)

Seismic data have on occasion shown bedrock to be many feet below refusals obtained through borings. But Father Linehan and men experienced in this work have noted that seismic data do not obviate the need for borings or field observations; rather, they enable the engineer to check and interpret the borings more intelligently, and to use fewer of them while obtaining more complete details.

Seismic techniques have been used for dam-site surveys and submarine cable-laying surveys. They can also be used for pipe-line or aqueduct locations where heavy cuts are anticipated. By a process of elimination, they indicate favorable locations for well-digging operations.

The New Seismograph

The new portable seismograph exhibited at the meeting is a pilot model recently developed by Century Geophysical Corp., Tulsa, Okla. Considerably lighter than previous models, it is designed specifically for the applications just discussed. The oscillograph and amplifier are housed in separate dustproof and waterproof aluminum carrying cases. The detectors, 12 in all, are ruggedly constructed and hermetically sealed. A unitized cable with 24 leads is wound on a reel designed for breast or back carry. The entire unit weighs approximately 100 pounds, although no individual piece weighs over 28 pounds.

The oscillograph is the heart of the system, recording the data and providing the controls and safety devices. The daylight-developing unit provides immediate development of the record while on site, a great help in this kind of work. It has a governor-controlled paper drive with paper speeds of 4 to 24 inches per second. The viewing screen on the new model indicates interference by external shocks or vibrations such as traffic or footsteps near the sensitive detectors. This permits the operator to trim the recording sensitivity properly. The amplifier in the new unit has integral testing and ac balancing circuits. The testing circuit is for testing the continuity of the cable and seismometers and battery



C. & E. M. Photo

Rev. Daniel Linehan waits for an oscillogram to be developed during the field demonstration of Century Geophysical's new seismograph.

voltage. The ac balancing circuits are for balancing out any 60-cycle interference which may be encountered near power lines or in metropolitan areas.

In the Field

For the afternoon field tests, Paul Bird selected a convenient site a few miles from the Bureau office. A car caravan carried some 60 or more men out to the site where Father Linehan and his crew were setting up the equipment. It took only a few minutes to set the detector line, tripod-mount the oscillograph, and drive a shot hole. Observers stood on the far side of the road while the instrument recorded the shock effects of the charge. Only one stick ($\frac{1}{2}$ pound) was necessary on a 440-foot run, and the small *pflut* hardly raised the tamped cover 6 inches.

The record was quickly developed while the crew set an equal charge at the opposite end of the run for a reversal. An old hand at this work, Father Linehan scanned the oscillograph record and said, "It's about 75 feet to bedrock at the upper end of the run". "About 60 feet at the lower end of the line", he said after seeing the record for the reversal. The calculated depths, based on curves plotted at the offices, were 77 and 57 feet respectively.

After seeing the demonstration and asking questions to their hearts' con-

tent, the observers separated, each going his own way to carry back a story of an interesting scientific development in soils engineering.

Programming Ties Up F-A Funds Too Long

It takes about 11 months for a Federal-Aid project to move through the programming stage—and during all that time, Federal construction funds for the project are tied up too. Public Roads Commissioner Thomas H. MacDonald pointed out this fact at the 45th Annual Meeting of the American Road Builders' Association.

On August 1 of last year, he said, \$365,000,000 of post-war Federal funds—84 per cent of an annual authorization—were tied up for projects that had not yet moved out of the program stage. Some of them had been in that stage almost 4 years. Half of the total had been programmed more than 16 months.

There's room for improvement here, said Commissioner MacDonald. It's not good administration to tie up construction funds that might be providing new facilities during this period. Basically, what is needed is better advance planning to provide a reservoir of projects from which to select for the current program those that can be advanced to construction rapidly. Current programs should be overhauled and all deadwood removed.

The BPR is also proposing that surveys and plans and right-of-way acquisition be programmed separately. Thus only the funds necessary for this step need be taken from one year's apportionment, while construction funds programmed as a second step could come from the following year's appor-

tionment. States could choose whether or not to use this plan. Where adopted, it should have the effect of providing the plans during one year for the construction program to follow the second year.

The Commissioner said that the need for advance planning and early improvement of strategic defense highways is more urgent today than ever before. One of the lessons we learned in World War II was that highways for national defense must be constructed between wars. After the shooting starts, all our energy and resources must be directed toward military activities, there is no time then to prepare extensive plans or construct projects that may take months or years to complete.

Shovel and Backhoe Unit Tractor or Jeep-Powered

A 4-page circular describing and illustrating the Hopto digger, a hydraulically operated power take-off trailer-type excavator, has recently been issued by the Badger Machine Co., Winona, Minn. All operating features, complete specifications, and a cross-section diagram which shows operating dimensions of the unit are included in the literature. On-the-job photographs illustrate some of its applications.

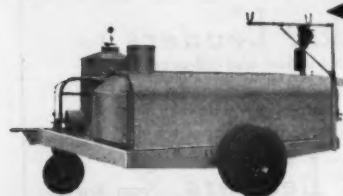
The catalog points out that the Hopto digs over 9 feet deep, has a full 183-degree swing, and works at an hourly capacity of approximately 15 to 30 yards in normal soil. Used as a backhoe, the unit may be rear-mounted on any farm or industrial tractor on a truck, or on a Jeep.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 54.

Sweep MORE MILES PER DOLLAR with 36" Dia. Brush on GRACE SWEEPERS

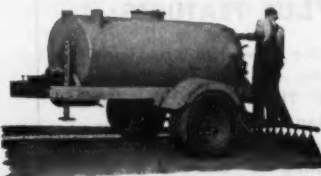


Large brush, chock full of fibre, and few moving parts reduce operation cost on Grace sweepers.



The RAPIDSPRAY MAINTENANCE DISTRIBUTOR Vacuum Cleans both Spraybar and Handspray and has other time-saving features.

More ASPHALT HEATED Less Flue Repairs with RAPID-FIRE CIRCULATING HEATER for Tank Cars



W. E. GRACE MFG. COMPANY

6003 Lamar Street

Dallas, Texas

Morse-Starrett WIRE ROPE CUTTER



CUTS WIRE ROPE

FASTER...

Especially designed cutting blade and dies assures fast cutting action. . . . The hammer principle eliminates any special skill requirements.

CLEANER...

No jagged ends. The wire rope is cut with ends smooth and clean for perfect threading or splicing.

SAFER...

The enclosed cutting blade locked in the body of the cutter assures perfect safety.

and it's

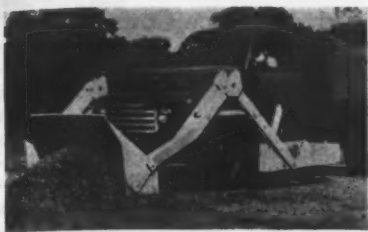
PORTABLE...

Models for tool kit or stationary operation. With cutting capacities up to: 1 inch, 1 1/16 inch, 1 1/2 inch.

SEE YOUR DEALER OR WRITE DEPT. "M"

Morse-Starrett Products Company

1204 - 49TH AVENUE, OAKLAND 1, CALIF.



Notice the elbow action of the Holmes-Owen dump-truck loader. The truck driver controls its digging, scooping, and loading movements from the cab.

Truck Self-Loader

The Holmes-Owen truck loader now being manufactured by Ernest Holmes Co., Chattanooga, Tenn., is a self-loading unit designed to speed the handling of loose materials and convert a dump truck into a complete and independent working unit. Because it is operated from the cab, it permits the truck driver to do his own light digging, grading, scooping-up of materials, loading, hauling, and unloading, the company points out.

The loader is double-jointed in design to give the flexibility of elbow action. It is powered by two independently operated sets of hydraulic cylinders. It can be mounted, the manufacturer states, on almost any standard dump truck, and when not in use, does not obstruct or interfere with the truck in any way.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 59.

New Flexible Tubing

Flexible tubing for ventilation and material conveying is made by the Flexible Tubing Corp., of Branford, Conn. Spiratube is a lightweight, highly retractable, non-collapsible, non-kinkable, flexible tubing applicable for underground ventilation, temporary heat conduction, products handling, fume or dust removing, etc.

Spiratube consists of a preformed continuous spring-wire helix secured with overlapping plies of spirally wound fabric. Three types of spring action are available: first, with the spring secured under compression to provide a self-extending or jack-in-the-box duct with an unusually smooth bore; second, with the spring secured in neutral position to have neither self-extending nor retracting action; and third, with the spring secured under tension to provide a duct that is axially retracted in normal position.

Standard base fabrics, Fiberglas, Nylon, rayon, and special fibers of varying weights and construction may be used to meet a wide variety of specifications as to life, temperature range, and chemical effects. Various fabric coatings may also be selected. Spiratube is available in sizes from 3 to 30 inches inside diameter.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 42.

Concrete Insert for Frames

An illustrated 4-page bulletin describing improved concrete inserts for Unistrut metal framing has recently been issued by Unistrut Products Co., 1013 W. Washington Blvd., Chicago 7, Ill.

It enumerates the features of the insert and points out that with the continuous slot in the patented Unistrut channel, fittings can be attached at any point along the entire insert face without disturbing attachments previously made. The bulletin describes a method of making your own inserts from short pieces of Unistrut channel and anchor-type drive-in end caps. Complete specifications are included.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 94.

Overload Release Protects Machinery

Slow-speed machinery that can be equipped with American reduction drives can now automatically protect expensive equipment against heavy shocks, impact, and choke-load conditions by means of a new mechanical torque-arm overload release. The release, developed by the American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29, Pa., is applicable to practically all types of slow-speed machinery—elevators, conveyors, mixers, etc.—the company says. Field tests indicate that the release effects economies by reducing machinery-maintenance expense, and minimizing down-time for repair or replacements of damaged machinery

parts. It may be installed without any alterations to the drive. The overload release automatically disengages itself and can be reset by the operator.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 7.

Traffic-Engineering School For Graduate Engineers

Opportunities for graduate engineering students to study transportation and traffic are described in a booklet just published by the Institute of Transportation and Traffic Engineering at the University of California. Titled "Opportunities for Study", the booklet describes the courses and curricula made available through the Institute at

Berkeley and Los Angeles, and outlines the Institute's research programs and facilities.

The Institute is at present most concerned with highway engineering, highway traffic, and airports. Graduate students can choose specialties and develop study and research programs suited to their backgrounds and objectives. Courses and seminars in transportation offered by the College of Engineering can be augmented with courses in transportation, planning, and administration offered in other departments of the University.

Interested students may obtain copies of the booklet by writing to the Director, Institute of Transportation and Traffic Engineering, University of California, Berkeley 4, Calif.



● By all standards, you'll find Marmon-Herrington All-Wheel-Drive Fords the world's best buy in multiple-wheel-drive trucks . . . best from the standpoint of performance-ability—carrying capacity—reliability—low operating and maintenance cost—ease and economy of service.

Today, Marmon-Herrington All-Wheel-Drive Fords are making tough jobs easy, all over the world—transporting capacity loads through deep mud, sand, snow; up steep hills and mountain grades . . . and doing it with amazing speed, ease and economy.

Marmon-Herrington All-Wheel-Drive Fords are available in 30 versatile models. Wheelbases range from 110" to 220"—G.V.W. from 5,300 lbs. to 35,000 lbs.—forward speeds from 4 to 10.

Don't buy any truck until you've had an on-the-job demonstration in a Marmon-Herrington All-Wheel-Drive Ford. Write for name of nearest dealer and illustrated literature.

MARMON-HERRINGTON COMPANY, INC.
1523 W. Washington St., Indianapolis 7, Indiana

SERVICE AVAILABLE AT FORD DEALERS EVERYWHERE . . .



Marmon-Herrington All-Wheel-Drive Fords are, for the most part, built of standard Ford Parts. Consequently, fast, efficient, low-cost maintenance and repair service is available at Ford dealers everywhere. When, occasionally, special parts are required, they are quickly obtainable through Marmon-Herrington distributors, conveniently located in principal cities the world over.

MARMON-HERRINGTON
All-Wheel-Drive

FORDS

Dravo Completes Bridge Substructure

The Contracting Division of Dravo Corp., Pittsburgh, Pa., has completed the substructure for a bridge which is a key project in the Pennsylvania Highway Department's program to link the Pennsylvania Turnpike at New Stanton with U. S. 40 at Washington, Pa. The 2,000-foot-long 4-lane highway bridge will span the Monongahela River to connect Belle Vernon and Speers, Pa., replacing an outmoded span 300 feet upriver. It will enable traffic between Ohio and the Pennsylvania Turnpike to by-pass Pittsburgh.

The substructure of the bridge consists of 11 concrete piers, 4 of them in the river, and a large concrete abutment on each side of the river. The underwater portion of each of the two main river piers consists of dual concrete shafts embedded in rock 70 feet below river level. A concrete distribution block 89 feet long, 24 feet wide, and 38 feet high rests on the shafts and supports two rectangular-shaped columns to which the structural framework of the bridge will be anchored. Both blocks are faced with North Carolina granite.

Dravo built cellular steel sheet-pile cofferdams to keep the river out while the two main piers were erected. Excavation beneath the river at this point necessitated dredging 33,000 cubic yards of material. The two smaller river piers and the seven land piers were built on steel piling driven down to rock.

In addition to the substructure, Dravo built two 20-foot concrete tunnels to carry the waters of Speers Run Creek into the river. This was necessary because the east approach to the bridge is on a hill adjacent to the creek and erosion could undermine the approach or dam the creek. One tunnel is 869 feet long and the other is 212 feet.

Approximately 14,000 cubic yards of concrete and more than 1,450 tons of steel were used on the project. Erection of the steel-arch cantilever-type bridge on the massive substructure is expected to start soon.

Socket-Wrench Tools

A new 1/2-inch square-drive socket-wrench set is offered by Snap-on Tools Corp., Kenosha, Wis. It consists of 15 double-hexagon sockets ranging in size from 7/16 to 1 1/4 inches, a 10-inch ratchet, 18-inch nut spinner, 15-inch sliding bar, 18 3/4-inch speeder, universal joint, and 3 1/2, 5, and 10-inch extension bars.

The sockets feature a lock groove in each of the four sides of the drive hole to grip the friction ball on the square drive of the handle. This four-way grip contributes convenience and speed when interchanging units. The ratchet has a 32-tooth action; only a 12-degree handle swing is necessary for operation in restricted areas. The new pawl is designed to engage two teeth of the gear at all times, thus furnishing a smooth ratchet action and additional strength. All units in the set are heavily chrome-plated.

Further information on these wrenches may be obtained from the company, or by using the Request Card at page 16. Circle No. 114.

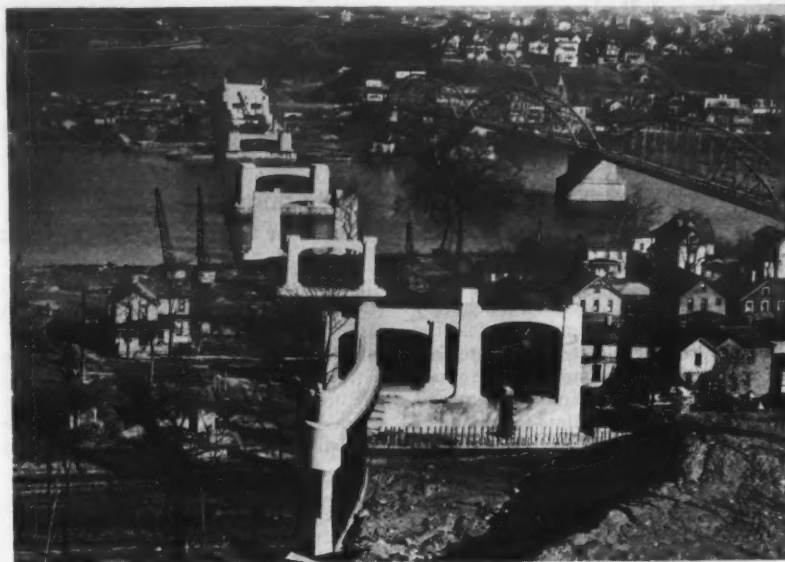


TWIN PRIME PUMPS

... Better performance
... Lower cost

DUAL VOLUTES, fast priming, non-clogging portable, long lasting centrifugal pumps. Distributors—write for attractive proposition.

OHLEH MACHINERY CO.
—WATERLOO 5 IOWA

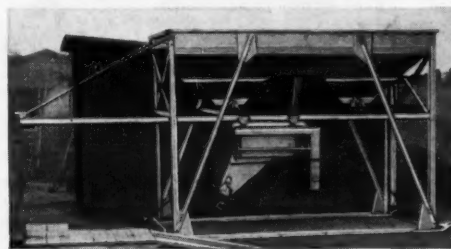


The substructure for the new 2,000-foot-long highway bridge across the Monongahela River at Belle Vernon, Pa., was built by Dravo Corp., Pittsburgh. The bridge is part of a plan to link the Pennsylvania Turnpike with U.S. 40 at Washington, Pa.

SAVE ON STORAGE EQUIPMENT COSTS ON COST OF MATERIAL HANDLING ON EQUIPMENT SET UP COSTS

WITH GAR-BRO "UNIT"

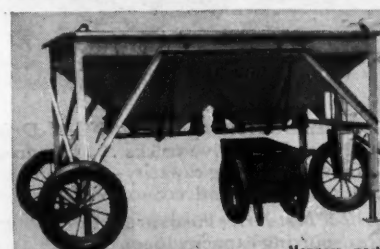
BATCH PLANTS



NEW, ENGINEERED BATCH PLANT UNITS include single and dual Aggregate Batching Bins, a 56 bbl. Bulk Cement Bin, and a 99 bbl. Auxiliary Cement Silo. They are all equipped with double rail track to carry a reversible weigh hopper. Bulk Cement Bin has enclosed bucket elevator and feed screw with hopper.

Here is the most versatile batching plant on the market. Each unit is a complete bin. All can be assembled in any combination to handle any number of aggregates and/or bulk cement. Write for special bulletin on Unit Batch Plants.

WRITE FOR CATALOG TODAY!



Hoppers, portable and semi, (8 Models). Cap. from 2 to 4 cu. yds.

Wheelbarrows (25 Models) of all styles with wood or steel handles.

Concrete Carts (6 Models) cap. 6 to 8 cu. ft.

Two-wheel Barrows (6 Models) of all styles.

Tower Buckets (5 sizes). Cap. from 8 to 36 cu. ft. Chutes available.

Special Concrete Handling Equipment built to your specifications.



Light-weight Buckets (4 Models). Cap. from 1/2 to 1 cu. yd.

Heavy-duty Buckets (13 Models). Cap. from 1/2 to 8 cu. yds.

Collection Hoppers (10 Models) with variety of discharges.

Transition Chutes of various types.

Laydown Concrete Buckets (8 Models) for use with transit mixers. Cap. from 1 to 5 cu. yds.

Concrete Floor Hoppers (20 Models). Cap. from 1/2 to 10 cu. yds.

Power-Cart handles 12 to 14 cu. ft. at 6 to 8 miles per hr. Turns in 4' radius.

Shovel Barrows (12 Models) with fulcrum-type feet pedal to elevate and dump load.

Road Surface Consolidation

"Calcium Chloride for Surface Consolidated Roads" is the title of a new 2-page condensed report now available from the Calcium Chloride Association, Ring Bldg., Washington 6, D. C. It describes recommended maintenance procedures for reshaping gravel roads, adding new materials, and applying calcium chloride.

This literature may be obtained from the association, or by using the Request Card at page 16. Circle No. 89.

Gulf Oil Promotes Brenner

Nevin T. Brenner has been appointed Chief Fuels and Lubricants Engineer, Tractor Section, Automotive Products Engineering Department, of Gulf Oil Corp., Pittsburgh, Pa. He will supply the Domestic Marketing Department with data on the application and performance of Gulf products in industrial tractors and in excavating and earth-moving equipment.

TOUGH ENOUGH to be treated rough



Heavy-duty Buckets (13 Models). Cap. from 1/2 to 8 cu. yds.

Light-weight Buckets (4 Models). Cap. from 1/2 to 1 cu. yd.

Collection Hoppers (10 Models) with variety of discharges.

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Two-wheel Barrows (6 Models) of all styles.

Tower Buckets (5 sizes). Cap. from 8 to 36 cu. ft. Chutes available.

Special Concrete Handling Equipment built to your specifications.

GAR-BRO MANUFACTURING COMPANY

2416 E. 16th ST., LOS ANGELES 21
DEALERS EVERYWHERE

Houston's Building Continues Unchecked

Texas Oil and Industrial Capital Leads Nation in Industrial Building Spree As City Mushrooms

WHEN George Sessions Perry told about Houston, Texas, in the *Saturday Evening Post*, he said, "The thing about Houston that really knocks your breath out is its fabulous, hardly believable growth."

The city is still growing so fast that *Business Week* found Houston first in value of industrial plant construction in the nation from July 1, 1945, to December 31, 1949. From the standpoint of building construction alone, Houston is making history.

Building permits are being issued within the city limits at a rate of more than \$10,000,000 in new construction a month. The total for the first quarter of 1950 pushed \$35,000,000 by just a few dollars. The city's building-construction program is keeping pace with its rapid industrial growth. Counting the volume of new home building, the total post-war program now approaches the billion-dollar mark.

Anywhere on the Skyline

Look anywhere on Houston's skyline, and you will see evidence in steel and concrete that the tremendous building program continues unchecked. Many new buildings have recently been added, like the fabulous \$20,000,000 Shamrock Hotel and the City National Bank Building.

New ones are scheduled to be added so fast that contractors will have a "building heaven" for years to come. For example, late in March the Prudential Insurance Co. announced a \$6,000,000 office-building project to house a new seven-story southwestern home office. The structure will be from 13 to 14 stories high, and will be located not far away from the big \$100,000,000 Texas Medical Center now under construction.

Bids are being taken shortly on the new \$5,500,000 M. D. Anderson Hospital, which will be a research and treatment center for cancer patients. It will also serve temporarily as the home of the University of Texas Postgraduate Medical School.

Dirt is flying near the Medical Center, for Rice Institute has a massive construction program under way on its 300-acre campus. Construction on a new \$4,000,000 stadium and field-house project contains so many unusual problems with quicksand and ground water that a full feature will soon appear in *CONTRACTORS AND ENGINEERS MONTHLY* on that work alone. The modern Fendren Library, built for \$2,000,000, is now open, and work is under way on a new dormitory.

In 10 years' time the University of Houston has grown from a start to a place in the sun. It now has \$10,000,000 worth of building construction under way. The projects include the \$5,500,000 Ezekiel W. Cullen Building and central power plant, which are near completion; the \$1,500,000 M. D. Anderson Memorial Library; and five dormitory buildings costing \$3,750,000.

Downtown buildings are going up just as fast. Battlesteins, a department store, reopened in April after completing a \$1,000,000 expansion program which doubled the capacity of the store. A new 16-story office building is being built by Jesse Jones Interests. A new \$2,000,000 office building is going up on Fannin Street. Sakowitz Bros. is putting \$8,000,000 into the city's most lavish department-store outlay, according to representatives of that firm.

Close by, Southwestern Bell Telephone Co. is erecting a modern long-distance telephone building, a part of the \$21,000,000 expansion program recently initiated by that company. Special lightweight aggregates are a feature of the concrete in this building.

Farther out, construction crews are busy with the new \$3,236,000 Methodist Hospital, due to be opened in 1951. It will be an 8-story structure, and will replace the present Methodist Hospital. A contract for the 233-bed Arabia Tem-

ple Children's Hospital is due any day.

Future Looks Bright

Building prospects for the immediate future look as bright as they have been since the war. For example, the Episcopal Church in Texas has organized the St. Luke's Hospital Group, which is preparing to build a 300-bed hospital. There will be a new \$6,000,000 University of Texas School of Dentistry. The new \$7,000,000 Jefferson Davis Hospital, a charity institution, is soon to be built.

Extensive remodeling to existing buildings is also due. The San Jacinto Hotel at the corner of Main and Walker in downtown Houston will have its face changed very shortly. The hotel is to be converted into a modern office and

commercial building.

May's, a department store, will spend \$3,000,000 renovating three floors of its building. The firm plans to occupy 55,000 square feet. There will also be a new Walgreen drug store and a 1,000-seat cafeteria in this building.

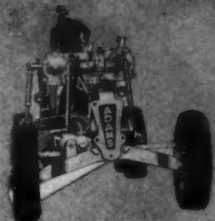
Building permits for the year 1949 in Houston totaled \$82,159,126. Figured on a per capita basis, that would rank Houston number one in the nation. The city building permits do not begin to cover the construction in the outlying industrial sections and along the Houston Ship Channel. County-wide, the figure was \$232,000,000.

Houston stands today as the south's greatest industrial city. Houston was knocking at the door of industrial (Concluded on next page)

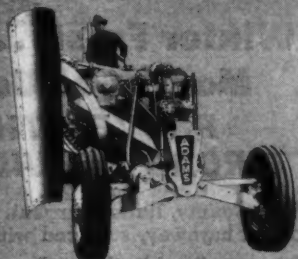
ONLY ADAMS

gives you this exclusive combination of advantages...

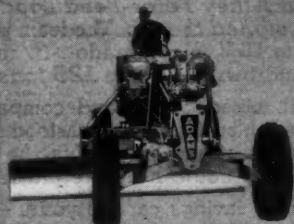
1. 8 Overlapping Forward Speeds... Flexible working range speeds work—increases output—provides high transport speeds.
2. WIDE RANGE OF BLADE POSITIONS—Without Mechanical Adjustments... Saves Time in Adapting Machine to Needed Cuts.
3. Positive-Action Mechanical Controls... Dependable, accurate adjustments—because they're geared... Easy, natural steering.
4. Ample Operating Clearances... Quick, easy adaptation to work... Operator comfort, convenience, efficiency.
5. Fast, Easy, Servicing Plus World-Wide Dealer Service... Saves time and money.



Ditch Cutting



High Bank Cutting



Reach Outside of Wheels



Reverse Ditching or Blading

On most construction work—ditching, low and high bank slopes, wide shoulder reach, etc.—the operator of an Adams Motor Grader obtains all necessary blade positions right from his station, without making any mechanical adjustments, such as shifting blade on circle or changing lift linkage. Only on occasional work, calling for extreme reach, is it

necessary to shift blade on circle.

The ability of Adams Motor Graders to provide such a wide range of blade positions—without mechanical adjustments—is one of the important features (see list above) that makes them the fastest, most efficient and economical graders on the market. See your local Adams dealer for full particulars.

J. D. ADAMS MANUFACTURING CO. • INDIANAPOLIS, INDIANA

Make your next motor grader an

ADAMS

Houston's Building Continues Unchecked

(Continued from preceding page)

greatness in 1939 when the war-preparedness program pitched it into its heavy industrial expansion program. This industrial growth continued during the war years, and unlike many areas of the nation, continued unabated after the war was over.

The area is drawing dozens of new petrochemical companies. Since the end of World War II, more capital has been invested in chemical plants along the Gulf Coast near Houston than in any chemical-producing region in America.

Thanks to its colossal building-construction program, Houston has come a long way in the last two decades from a once-sleepy town along Buffalo Bayou. Its concentration of building construction is probably the heaviest in the nation.

New Crankcase Oil

An improved crankcase oil for diesel and gasoline engines, designed to combat sludge and engine deposits under severe operating conditions, has been announced by the D-A Lubricant Co., Inc., 1311 W. 29th St., Indianapolis, Ind. The dispersant action of the new oil is said to prevent ring sticking, valve and rocker-arm deposits, and excessive liner wear when high-sulphur fuels are used. The oil is also designed to prevent rust and moisture corrosion in engines that are idle or in storage. Its alkaline factor is said to neutralize the corrosive acids of combustion, thereby extending the normal overhaul period.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 121.

Blaw-Knox West-Coast Office

The Construction Equipment Department of Blaw-Knox Co., Pittsburgh, Pa., has a new west-coast district office in the Monadnock Bldg., 681 Market St., San Francisco, Calif. Louis J. Sarosdy, a veteran Blaw-Knox engineer, is Manager of the office, assisted by Lester M. Horton.

The territory which the new office covers consists of British Columbia, Washington, Oregon, California, western Montana, Idaho, Utah, Nevada, and Arizona.



Littleford's new water sprinkler tanks come in capacities of 800 to 1,500 gallons and in gravity and pressure-type models.

New Sprinkler Tanks

A line of water sprinkler tanks for soil stabilization, dust control, weed control, and water-hauling applications has been announced by Littleford Bros., Inc., 453 E. Pearl St., Cincinnati 2, Ohio. The tanks are made in two models, gravity type and pressure type, in capacities from 800 to 1,500 gallons. Both models can be mounted on skids, trucks, or 4-wheel trailers. Designed to stand rough use, these sprinklers have large manholes for easy filling and spraybars which are easy to remove. The spraybars can be made with shifting and end-folding features.

Further information may be secured from the company. Or use the Request Card on page 16. Circle No. 56.

Improved Power Saw

The versatility of the Buday portable power saw has been increased by interchangeable blades which enable the saw to cut metal and masonry as well as wood, according to an announcement by the Ennis Supply Co., 525 Northwestern Bank Bldg., Minneapolis 2, Minn., now exclusive distributor for the saw.

The Buday is a portable rotating-top power saw for cutting building brick, tile, concrete blocks, pipe, sheet metal, conduit, BX cable, and other standard building items. Gasoline-engine powered, it is entirely self-contained. Its working table is calibrated in degrees

and carpenter pitch, and may be rotated 360 degrees. The saw can accommodate wood of any length or width, up to 4 inches thick.

Further information may be obtained from the Ennis Supply Co. Or use the Request Card at page 16. Circle No. 36.

Plastic-Lined Bag For Calcium Chloride

The adoption of a new-type polyethylene-lined paper bag for flake calcium chloride has recently been announced by the Solvay Sales Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. This new bag will be used for both the 100 and 25-pound packages. It is reported to be stronger, possess a higher resistance to moisture, and have a longer storage life than the bag previously used. In addition, the polyethylene lining is not affected by extremes of temperature and will not crack in cold weather nor melt in hot weather, the company says.

Further information on Solvay calcium chloride and its uses may be secured from the company. Or use the Request Card at page 16. Circle No. 2.



Winter Frosts... Spring Thaws... Months of Use and Abuse... PROVE ATHEY LOW-COST ROAD REBUILDING METHODS

Will County, Illinois, urgently needed a new surface on a section of old highway, surfaced with bank-run gravel and an oil mix.

Johnston Road Builders, Inc., went to work on the project. Their motor grader scarified the surface 6" deep, producing material made up of 6" and 8" rocks and gravel, that had to be reduced. An Athey Force-Feed Loader-Portable Breaker Plant was assigned the job. The team picked up the material... crushed it to 1½" minus grade... returned it to the roadbed in even windrows — 100 to 125 tons per hour!

Oil mixed, rolled and compacted, the material made a new, smooth surface that withstood seven months of the hardest travel and weather! This, plus the savings in material, time and money could not be equalled with any other method!

These savings can be yours — with an Athey road-rebuilding team on your job. See your Athey-"Caterpillar" Dealer for more details — today!



The modern Athey method of road-rebuilding gave Will County unequalled savings, as well as a strong, smooth-surfaced road. Look at the big rocks that were picked up, crushed and made into the good road at top... still smooth after 7 months of the hardest use!

Athey Products Corporation, 5531 West 65th Street, Chicago 38, Illinois

Athey

Road Rebuilding Equipment
Force-Feed Loader and Portable Breaker

DESIGNED TO DECREASE "DOWN TIME"



Speedy repair of worn-out thrust washers on heavy equipment cuts "Down time" to a minimum, with no time-out for dismantling.

To replace thrust washers, simply slip "Sabeco's" patented split thrust washer around shaft and lock into place. Result — a perfect job — many hours saved. "Sabeco" Split Thrust Washers, available in any practicable size, are made of "Sabeco" Bronze or bronze to specification.

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A PRODUCT OF
SAGINAW BEARING CO.
821 S. WATER SAGINAW, MICHIGAN



The new Genwind portable paint sprayer delivers pressures up to 12 pounds without pump or compressor

A Portable Sprayer

A new portable paint sprayer designed to deliver low-pressure high-volume spray without mist or paint fog, is manufactured by The Genwind Corp. of America, 701 Seneca St., Buffalo 10, N. Y. The Genwind delivers materials at a 10 to 12-pound pressure without a pump or compression tank, using a series of fans that supply the pressure on the "jet propulsion" principle. The 10½-pound sprayer can be carried easily by hand. It is powered by a 110-volt ac-dc universal ¾-hp motor. Eighteen feet of electrical cord permits freedom of movement.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 17.

Expands Sales Organization

In line with its program of sales-department expansion, the Federal Motor Truck Co., Detroit, Mich., has promoted several members of its staff. Walter L. Hayes, formerly head of the company's eastern field organization, is now Assistant General Sales Manager with headquarters in Detroit. Harry L. Norton, a member of the sales department since 1946, will assist Hayes as Truck Distribution Manager. W. A. Knechel has been promoted from Factory Sales Representative to Assistant General Sales Manager of the eastern territory.

H. P. Hart has been appointed Factory Sales Representative. From headquarters in Philadelphia, he will supervise dealer relations and sales activities

in eastern Pennsylvania and Delaware. Before this appointment Mr. Hart was the head of his own transportation line.

Vibrating Screen Bulletin

A 12-page catalog describing Style M Robins Vibrex screens has recently been issued by Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J. The features claimed in the literature for the screens are the Robins circle-throw principle, adjustable amplitude of vibration, and an automatic balance. A detailed explanation of the features is included in the bulletin.

Full description is given of the construction of the live frames, the vibrator, and the mounting. These screens can be either floor mounted or suspended and are available in 11 different sizes ranging from the 36 x 78-inch to the 16 x 168-inch screen.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 24.

HERE'S A FASTER, EASIER, CHEAPER WAY TO HANDLE MORE DIRT, ROCK OR GRAVEL!

OMAHA STANDARD TRAILERS



The OMAHA STANDARD "CENTER DUMP" Trailer . . .

. . . Custom Built to Job Requirements is designed for contractors who want to haul dirt, gravel, rock, long or short distances, quickly and at low cost, for stock piling, spreading or dumping. Contractors say it is just what they have been looking for!

- ★ Each unit built to job requirements.
- ★ Available in sizes and lengths to meet all bridge and axle laws.
- ★ All steel welded body, chassis. Built to withstand roughest loading, toughest service.
- ★ Dumping mechanism FOOL-proof—trouble-FREE!
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- ★ DOOR OPENING Meter control that can be pre-set.

Write at once for specifications and descriptive folder that will answer your questions and show how you can make every load a "profit" load. Address today—

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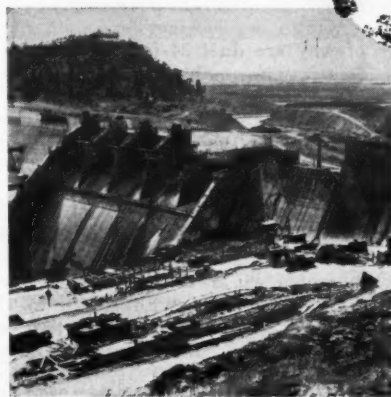


Dorena Dam
U. S. Corps of Engineers
Dorena, Oregon
Proof . . . that you use less Protex!

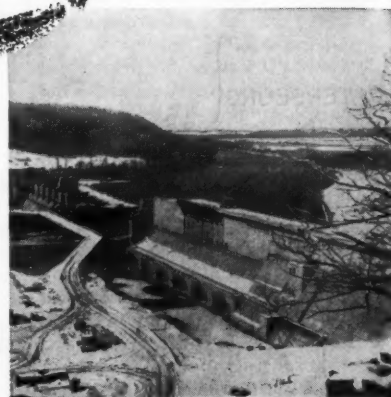


Walla Walla Dist. Corps of Eng. Photo
McNary Dam
U. S. Corps of Engineers
Plymouth, Washington
Proof . . . that the larger projects specify Protex!

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Protex
AIR ENTRAINING AGENT
costs less to
use!



Angostura Dam
U. S. Bureau of Reclamation
Hot Springs, South Dakota
Proof . . . of Protex leadership in Air Entraining Agents!



Ft. Gibson Dam
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Proof . . . that Protex gives consistent control!

When you're pouring millions of yards of concrete, every penny saved means a lot. That's why Protex Air Entraining Agent is used in so many large dam projects . . . proof of the quality of Protex . . . proof that it actually takes less Protex AEA than other admixtures! Protex AEA meets the requirements of Specifications SS-C-192, ASTM Spec. C-175-48T, is widely used by Bureau of Reclamation, U. S. Corps of Engineers, Bureau of Public Roads. Write, wire or phone for complete information!

Protex is specified by more large projects . . . because Protex brings CONSISTENT results—at lower costs!

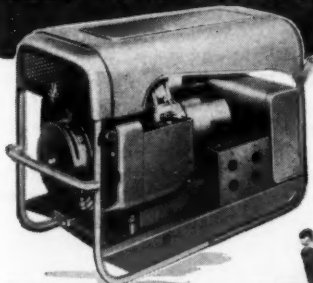
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Use Electric Tools on Every Job

Carry, wheel, or truck 'em to any spot and plug in for all the electric power you need. Lightweight, Onan air-cooled electric plants supply power for electric drills, saws, planers, spades, tampers, lights . . . any electrical equipment. Lightweight A.C. models: 400 to 3,000 watts. D.C.: 750 to 5,000 watts. (Heavy-duty gasoline or Diesel plants to 75,000 watts.)

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D. W. ONAN & SONS INC.

4850 Royalton Ave., Minneapolis 5, Minnesota

Penn Turnpike Extensions Go East—Go West

**Superhighway Will Extend
327 Miles From Ohio State Line
To Philadelphia With 67 and
100-Mile Additions**

† SOMETIME next year, according to present schedules, the Pennsylvania Turnpike will be completed from Philadelphia west to the Ohio border. The present 160-mile superhighway, now connecting Irwin on the west with Middlesex on the east, has two extensions under construction. The 100-mile eastern extension continues the Turnpike from Middlesex, near Carlisle, on across the Susquehanna River south of Harrisburg, to terminate at King of Prussia on the northwest perimeter of metropolitan Philadelphia. From Irwin, the 67-mile western extension runs northwest, by-passing Pittsburgh on the north, to end at the Ohio state line just east of Petersburg, Ohio, about 24 miles south of Youngstown, Ohio. The Turnpike will thus connect the state's two largest cities—Philadelphia in the east and Pittsburgh in the west—with Harrisburg, the capital.

Like the original Turnpike, the new portions will be limited-access toll highways with dual concrete roadways separated by a median strip, and will be free of traffic lights and grade crossings. Work on the eastern extension got started first shortly after the Pennsylvania Turnpike Commission began awarding contracts in September, 1948. Award followed award, until a year later the entire 100-mile eastern end was under contract. The cost of this stretch is estimated at \$75,000,000, and it is scheduled for opening this October. The Pennsylvania State Department of Highways will construct a connection from the eastern terminus at King of Prussia to the Philadelphia city line along the Schuylkill River.

Ground was broken on the western extension in October, 1949, when the D. W. Winkelman Co. of Syracuse, N. Y., was awarded a contract for the

first section. Other contracts are following. The estimated construction contract cost of this 67-mile portion of the Turnpike will be around \$52,998,000. It is expected to be completed by mid-1951. The initial construction carries the Turnpike from Irwin on U. S. 30—the Lincoln Highway—northwest to Monroeville on U. S. 22—the William Penn Highway—where an interchange will provide for a direct connection with Pittsburgh.

Pennsylvania Turnpike

How highway construction costs have risen in a decade is strikingly illustrated by comparing \$166,031,500, the approximate cost of two sections totaling 167 miles, including preliminary costs, right-of-way, engineering, etc., with the \$73,822,400 cost of the present 160-mile Turnpike when it was built in 1938-1940.

Too, the original section has 7 tunnels, totaling 6.7 miles, which pierce the rugged Appalachian mountains of Pennsylvania! However, only one of these tunnels was the complete work of the road builders. The others had been partly dug for the projected line of the South Penn Railroad that was to compete with existing rail transportation across the Keystone State. The competitors made a deal with each other, however, and the rail project was abandoned in 1885. The tunnels lay in silent decay for over half a century until the start of construction on the present superhighway. Then they were completely holed through, lined, and paved.

The entire original 160 miles was completely constructed in less than 2 years! This amazing speed was related to the financing of the project. Since the Turnpike was the pioneer in major toll-road construction, private financiers were reluctant to underwrite a new, untried, and unproved project in the field of investments. The Turnpike Commission, created by the General Assembly of Pennsylvania in 1937, had no authority to appropriate public

funds, but it could issue and sell bonds, payable solely from road revenue, to cover the cost of construction.

Accordingly \$40,800,000 worth of Turnpike bonds were sold through the Reconstruction Finance Corporation to a syndicate of private banking interests, and the remaining \$29,250,000 required was obtained by an outright grant from the Federal Public Works Administration as a measure for providing employment during the depression. Turnpike Commission officials contend that if banking and financial interests, plus the general public, felt then as they do now about the project, the Turnpike could have been financed entirely from privately sold revenue bonds at a savings of \$5,000,000 to \$10,000,000. For both the RFC and the PWA required extra services in engineering, inspecting, auditing, etc. common to projects subsidized by the Government. Contractors were also forced to bid higher to cover contingencies arising from regulations as to the time, type, and character of labor, land acquisition, etc.

But the greatest requirement of all was that the project on which ground was broken October 27, 1938, be completed by June 29, 1940! A three-month extension was obtained, and one of the greatest highway construction feats of the century was achieved when the 160-mile Turnpike was opened to traffic on October 1, 1940.

Superhighway Extensions

The east and west extensions will embody all the modern engineering features of the original Turnpike with some added refinements. In the more rugged country of the initial construction, the maximum grade is 3 per cent and the maximum curve is 6 degrees. On the extensions, where the terrain is more rolling than precipitous, grades are held to 2 per cent and the greatest curvature is 3 degrees. The extensions also have a special 6-inch subgrade of selected material to provide a foundation and drainage course for the reinforced-concrete pavement.

Within the 200-foot fenced-in right-of-way are dual 24-foot pavements of 9-inch uniform-thickness concrete having a straight slope to the outside at the rate of 4 inches in 24 feet. From the edge of the pavement the 10-foot stabilized shoulders slope 1 inch to the foot. The 6-inch special subgrade is continued out under the shoulders. Cut and fill slopes, 1½ to 1, start at the edge of shoulders. The pavements are separated by a 10-foot median strip that is depressed with slopes to the center at the rate of 1 inch to the foot. It consists of suitable earth covered with topsoil.

Along the median strip, 2½ feet below the center, is a line of 6-inch underdrain feeding into inlets at frequent intervals. Other inlets are located in cut sections at the outside

edges of the shoulders. Other lines of 6-inch underdrain are placed in cuts where needed, 3 feet below the outside of shoulders. Cross drainage consists of reinforced-concrete pipe connected to other RC lines, 18-inch minimum, running longitudinally in cuts at the edge of the roadbed. In fill sections, the cross drains outlet into paved channels or corrugated-metal pipe submerged in the slope.

The 9-inch concrete pavement contains air-entrained cement, and is reinforced with mesh laid 3 inches below the surface. Contraction joints are installed every 46 feet 6 inches, while expansion joints are spaced 900 feet plus/minus, at the beginning and end of horizontal curves, and at both sides of structures interrupting the pavement surface.

The entire Turnpike, existing and new sections, is designed with transitional spirals and superelevated curves for vehicular speeds of 70 miles per hour.

Engineering and Financing

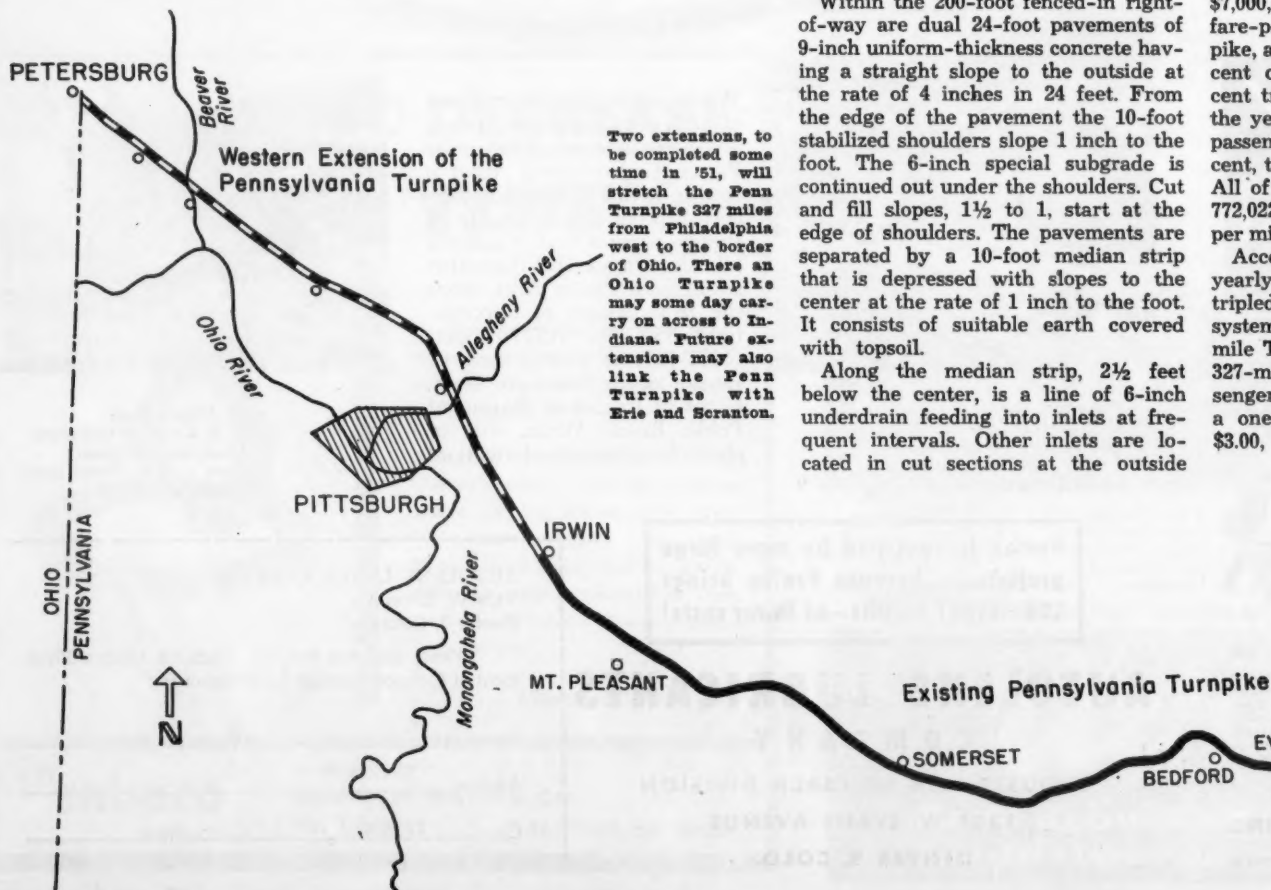
Choice of alignment in locating the Turnpike extensions was speeded with the use of aerial surveys to produce the necessary topographic maps. When the aerial work was completed, the design plans and cost estimates for the construction were prepared by several private engineering firms under the direction of the Turnpike Commission staff. The construction contracts are inspected and supervised by the Commission's field engineers.

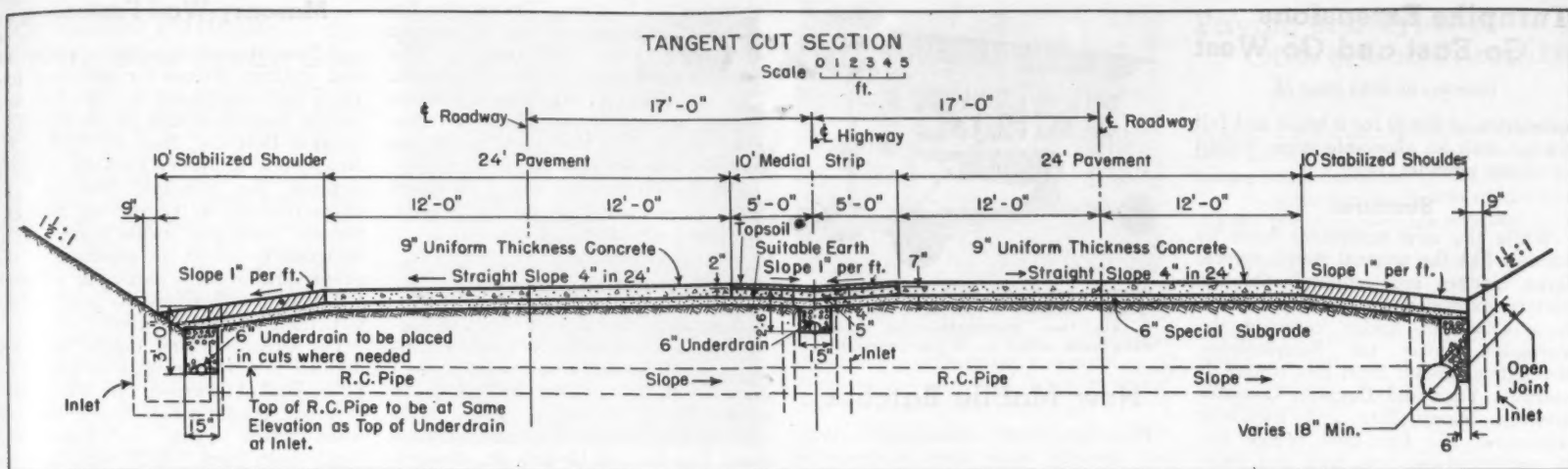
For financing purposes, the original road and the two extensions were combined into one system. The same group of investment bankers handled the entire financing. At the same time that the bonds were marketed and sold for the eastern extension, the old Turnpike bonds were also refunded with a \$134,000,000 issue—one of the largest of its kind in American history. After the western extension was financed, the Commission had \$211,500,000 of revenue bonds outstanding.

Engineering studies of traffic and costs of operations indicated that potential revenue from the whole system will be adequate to cover the operation, maintenance, and other costs of the combined 327-mile Turnpike. At present, the annual revenues average \$7,000,000. During 1949, some 3,848,788 fare-paying vehicles used the Turnpike, an average of 10,545 a day—77 per cent of them passenger cars, 22 per cent trucks, and 1 per cent busses. Of the year's \$7,049,543 total revenue, the passenger cars accounted for 35 per cent, trucks and busses for 65 per cent. All of the vehicles accounted for 374,772,022 miles of travel for an average per mile rate of \$0.0188.

According to estimates, the average yearly revenue of \$7,000,000 should be tripled within 13 years over the entire system. Toll fees for the present 160-mile Turnpike will be doubled for the 327-mile total across-state route. Passenger cars are now charged \$1.50 for a one-way fare; medium trucks pay \$3.00, with the rates increasing to a

(Concluded on page 36)





Typical 4.7-Mile Contract Includes Paving of 24-Foot Dual Concrete Roadways at The Eastern End

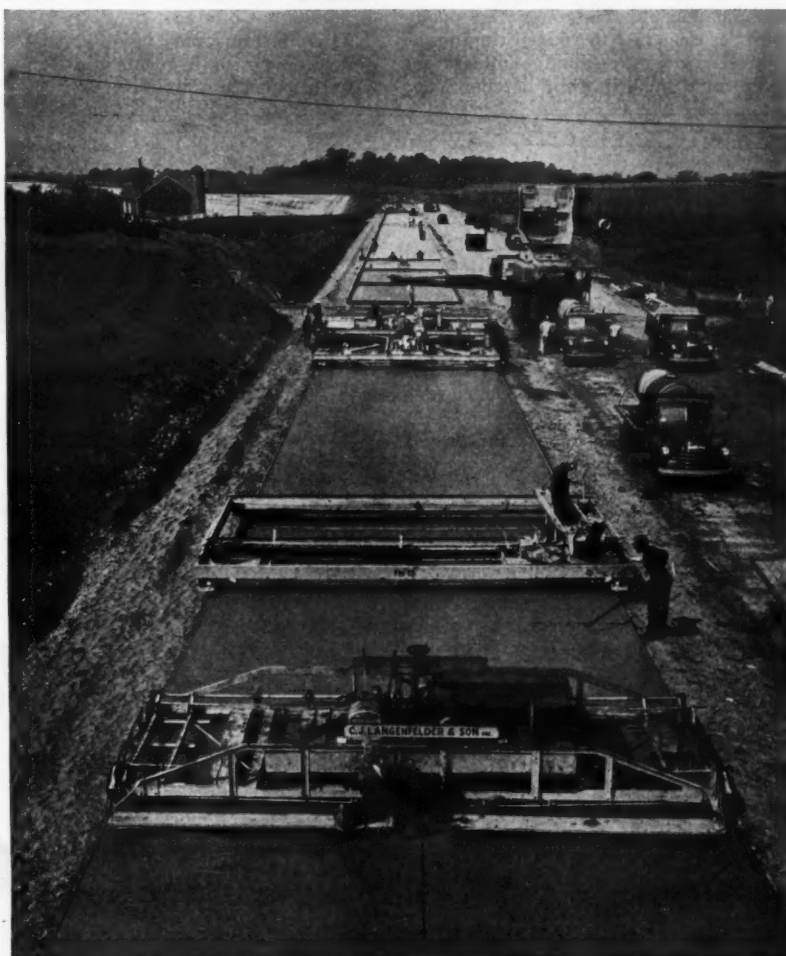
IN constructing the 100-mile eastern extension of the Pennsylvania Turnpike, the Commission engineers divided the work into projects varying in length from 2.7 miles to 6.4 miles. Contracts for these sections generally included grading, drainage, structures, and paving. Such a typical contract was the 4.7-mile stretch that the Pennsylvania Turnpike Commission awarded to C. J. Langenfelter & Son, Inc., of Baltimore, Md., on its low bid of \$2,538,763.36.

Known as Contract No. 209, the work covers Section 23-A lying in Dauphin County, Townships of Lower Swatara and Londonderry. On new location, of course, the project begins about 10 miles southeast of Harrisburg, just west of State Route 441, and continues easterly 4.7 miles to State Route 341. Eight bridge structures are included in the contract, but these are mainly grade separations. (A 6-span bridge over Swatara Creek, about 1½ miles from the west end of the job, is part of contract 211 awarded to John H. Wickersham Engineering & Construction Co. of Lancaster, Pa. The creek empties into the Susquehanna River a short distance south of the Turnpike.)

Contract 209 was awarded on April 19, 1949, and by August 10 the grading had advanced to permit the start of paving operations. A time limit of 270 calendar days was given the contractor. This was met, with the paving being completed by the end of 1949. The eastern extension of the present Turnpike is scheduled to be opened this October. Most of the other contractors worked as much as possible through the 1949-1950 winter season, shutting down only when forced to do so by inclement weather.

Special Subgrade

Underneath the dual 24-foot concrete pavements, 9 inches in uniform thickness, is a 6-inch foundation course of special subgrade which extends out through the 10-foot stabilized shoulders. This drainage blanket is intended to prevent pumping at the joints, and to check excessive loss of mortar from the freshly-placed concrete. The contractors were given great leeway in choice of material for the special subgrade and in gradation.



C. & E. M. Photo

On contract No. 209 of the eastern Turnpike extension, steel strips for the longitudinal joint are inserted in the 24-foot pavement from a Flex-Plane machine. Up ahead is a Koehring Longitudinal Finisher, then a Blaw-Knox dual-screed finishing machine and a Blaw-Knox spreader. The paver is a Rex dual-drum 34-E.

The material consisted either of broken, crushed, run-of-cruiser, run-of-bank stone or slag; sand, sand and gravel, run-of-bank gravel; or a combination of these materials. Some of the contractors on the various projects bought slag from the near-by steel mills; some set up portable crushers for crushing the rock taken out of cuts on the job; some used crusher waste from limestone quarries in the vicinity; others availed themselves of disintegrated sandstone found on the right-of-way, or of any of the above mentioned combinations. Langenfelter laid about 4,000

linear feet of slag on his contract, and sand the rest of the way.

Slag came from the Bethlehem Steel Co. mill at Steelton, less than 10 miles from the west end of the job, and the sand from a pit at Mastersonville, 12 miles away. Trucks dumped the material on the roadbed where it was spread in two courses by dozers and graders, and compacted by a 10-ton 3-wheel roller to a depth of 6 inches. The special subgrade was wet thoroughly the night before paving was scheduled over that section. It was wet again with a hose from the paver just before the concrete

was placed. The material used on this contract conformed to No. 2 gradation requirements.

The gradation of the four different permissible sizes is as follows:

Sieve Size	Per Cent Passing	No. 1	No. 2	No. 3	No. 4
4-inch	100	....	....	....	....
2½-inch	100	....	....	....	....
1½-inch	40-90	....	....	....	....
¾-inch	40-90	....	....	....	....
¾-inch	....	....	....	40-90	100
No. 4	....	....	....	40-90	....
No. 10	....	....	....	40-90	....
No. 200	0-30	0-30	0-30	0-30	0-30

Batch Plant

In the meantime the contractor had set up his concrete batch plant along the north side of the Turnpike just east of Swatara Creek. Bulk cement, air-entrained with Vinsol resin at the mill, was purchased from the Allentown Portland Cement Co. It was shipped in railroad cars from the Evansville, Pa., plant to a siding of the Pennsylvania Railroad at Royalton, Pa., a 3-mile haul to the batch plant. The siding was high enough in the air to permit a hole to be dug into it at one point so that trucks could back under for a load of cement. Three closed-in trucks, holding 40 barrels each, hauled cement to the plant, where it was dumped into a hopper and hoisted by worm gear and elevator to a Butler 275-barrel storage bin.

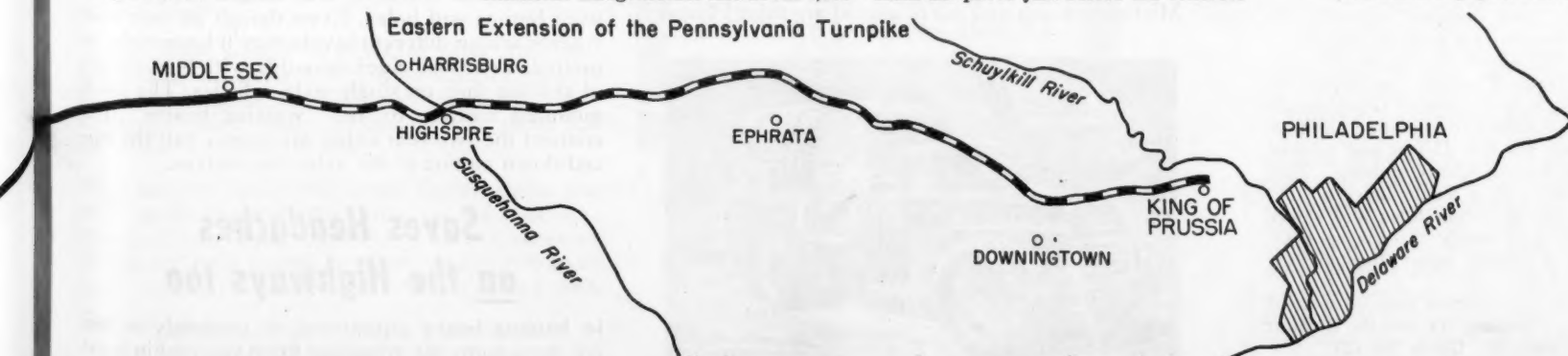
Sand was supplied by the Warner Co. of Morrisville, Pa., and shipped by rail to the same siding where it was unloaded by a Koehring ¾-yard clamshell crane and trucked to the batch plant.

Two sizes of stone for the coarse aggregate came from the H. K. Smith Co., of Palmyra, Pa., 10 miles away, and were delivered by truck. Sand and stone were stored in a Blaw-Knox 105-ton 3-compartment aggregate bin which was charged from the stockpiles by a Northwest crane equipped with a 55-foot boom and an Owen 1½-yard clam-shell bucket.

The Mix

A fleet of 10 trucks, holding two batches each, with separate metal containers for the cement, hauled the materials to the Rex dual-drum 34-E paver equipped with a 30-foot boom. Water for the mix was pumped from Swatara Creek by a Gorman-Rupp 3-inch pump (a similar pump was held for a standby) and hauled to the paver in a pair of 1,000-gallon tank trucks. The water was transferred from tank to paver

(Continued on page 37 Col. 4)



Turnpike Extensions Go East and Go West

(Continued from page 34)

maximum of \$10.00 for a truck and full trailer with an allowable gross weight of 62,000 pounds.

Structures

While the new extensions have no tunnels like the original route, several large bridges are required. On the eastern extension the major structure is a 4,526-foot bridge carrying the Turnpike across the Susquehanna River downstream from Harrisburg. It connects York and Dauphin Counties between Marsh Run and Steelton-Highspire. The four-lane bridge has 45 reinforced-concrete land and river piers and two abutments carrying structural-steel deck girder and beam spans. The two 26-foot roadways will be paved with concrete. Booth & Flinn, Inc., of Pittsburgh is building the span at an estimated cost of \$4,777,500. It is scheduled for completion about July 20.

Both branches of the Pike have their full quota of interchange structures. Their construction is included in the general roadway contracts which cover grading, drainage, structures, and paving. The lengths of contract range from 2.5 to 6.4 miles. On the western extension, large bridges will span the Beaver and Allegheny Rivers; the Brush Creek, Plum, and Willow Run Viaducts will also be major structures.

Future Connections

Still in the preliminary stages is the Ohio Turnpike that may, in the future, run northwesterly from the Pennsylvania Turnpike at the Ohio border across the state to the Indiana line. It would tap traffic from such large Ohio cities as Youngstown, Akron, Cleveland, and Toledo, and tie in with superhighways being projected between Detroit and Chicago across Michigan, Indiana, and Illinois. The Ohio Turnpike Commission is undertaking engineering studies to fix the best location.

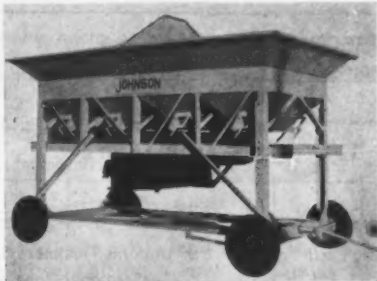
The General Assembly in the session of 1949 enacted legislation to project extensions to Erie and Scranton to connect with the finished turnpike system. No action on these projects can be considered, however, until at least 24 calendar months after the opening of the western extension of the system to traffic.

In the meantime the New Jersey Turnpike Authority has already awarded the first contract for the construction of its 118-mile superhighway toll project which will cross the state from north to south. The New Jersey Pike is scheduled to be completed within a period of 2 years. Plans for trans-state toll highways are still in the talking stage in several other states, among them Indiana and Illinois. If these all materialize, it will be possible before too long to drive on a modern high-speed toll highway from New York on the Atlantic seaboard across the country to St. Louis on the Mississippi River, without having to stop for a single traffic light or cross-road.

Concrete-Curing Mat

Cotton mats designed especially for curing concrete are made by Crawford-Austin Mfg. Co., Sixth and Jackson Sts., Waco, Texas. They are guaranteed, the company says, to meet all requirements of the AASHTO designation M73-38. The mats are 6 x 22 feet and covered top and bottom with Osnaburg. They are filled with a single layer of uniformly felted cotton filler and sewed together with heavy threads approximately 4 inches apart through the length of the mat.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 123.



Overall height of this new Johnson trolley batcher, a 20-ton panel unit, is 8½ feet. Pneumatic-tired wheels have been added to it for portability.

New Mobile Batcher

Pneumatic-tired wheels and a tow-bar assembly have been incorporated in the new Lo-Bin trolley batcher, announces the C. S. Johnson Co., of Champaign, Ill. The improved portability is designed to reduce time losses between job moves and eliminate the need for dismantling the batcher when

changing job locations. The batcher has a maximum bin capacity of 30 tons and a charging height of 9½ feet. It can be furnished to handle 2, 3, or 4 aggregates. The 22-cubic-foot traveling aggregate hopper is cantilevered to ride out beyond the end of the track and dump directly into a mixer skip.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 41.

Safety Equipment Offered

A series of circulars is available describing a complete line of safety equipment for first-aid, respiratory protection, fire protection, and face and body protection in hazardous work. It is offered by the Davis Emergency Equipment Co., Inc., 45 Halleck St., Newark 4, N. J. Specifications, illustrations, and detailed information on each of the products are offered.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 69.

Masonry-Wall Fastening

A new 34-page catalog on anchoring and drilling devices for fastening fixtures and equipment to masonry and hollow walls is offered by the Star Expansion Bolt Co., Inc., 147 Cedar St., New York 6, N. Y. Catalog No. 148 outlines the principal features and characteristics of the various Star expansion bolts and toggle bolts, and is designed to aid in the selection of the proper anchor for a particular purpose. Detailed specifications, as well as instructions for use are given.

The expansion and toggle bolts are divided into four categories according to the kind of fastening with which each is used: machine-bolt types, lag and wood screw types, nail types, and toggle-bolt types. Each type is made in a number of sizes and styles. The catalog includes recommended drilling procedures and a drill selection chart.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 100.

**THIS
6-WHEELER
keeps its "Hind Feet"
on the ground—
ALL FOUR!**

**And it comes as light as
24,000 lbs. GVW**

YOU ought to ride one of these new GMC middle-weight six-wheelers over rough ground—and see how it travels.

Mister, you can pull out of almost anything! These



babies have DUAL rear drives—and you can have 'em with an optional differential lock-out that assures you of pulling power as long as the two wheels of either axle have traction. And the differential lock-out, controlled from the cab, means no loss of power through slippage in mud, sand or slick, loose going.

Each dual rear wheel is "free hinged" to roll right over bumps and holes. Even though all four rear wheels are on different levels they'll keep right on pulling. Your load rides smoothly with less chance of shifting than on single-axle vehicles. The load, mounted midway on the "walking beams" that connect the two rear axles, takes only half the up-and-down motion of the axles themselves.

**Saves Headaches
on the Highways too**

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Controlled Pattern With New Spray Gun

A new paint spray gun developed by the Eclipse Air Brush Co., 390 Park Ave., Newark 7, N. J., is designed to control the width of the spray pattern from the size of a silver dollar to a swath more than 12 inches wide. The Model GAT-2 gun embodies a new type of controllable nozzle. The nozzle design uses the Eclipse low-pressure principle, said by the company to be particularly effective in reducing fumes, minimizing air consumption, and saving paint. The turn of a thumb screw at the back of the gun provides a wide range of spray patterns. Control adjustments may be made without interfering with the spraying operation.

The new gun also features a four-finger trigger designed to reduce operator finger fatigue and enable the user to handle the gun with bulky gloves. According to Eclipse, a stream of material may be projected in a workable pattern to normally inaccessible sur-



The convertible nozzle on the new Eclipse spray gun is designed to provide exact spray patterns.

faces up to 6 feet beyond the gun. It is recommended by the company for high-speed production painting which requires a pattern control.

Further information on the Eclipse spray gun may be secured from the company. Or use the Request Card at page 16. Circle No. 15.

Electric Capstan Carpuller

A circular describing the Superior electric capstan carpuller, designed for car moving, barge spotting, pipe bending, and similar duties, has recently been offered by Superior-Lidgerwood-Mundy Corp., 7 Dey St., New York 7, N. Y. The literature points out that the Superior carpuller offers pushbutton operation, weatherproof construction, a high-torque enclosed flange-mounted motor, anti-friction bearings, and a clear lead for the rope in any direction.

The unit may be powered by a 5, 7½, or 10-hp drive, providing line pulls of 2,000, 3,000, and 4,000 pounds respectively.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 25.

Paving Job Typical Of Work on Turnpike

(Continued from page 35)

through a 2½-inch rubber hose. Batches were mixed for 1¾ minutes in the paver before being deposited on the subgrade.

A 37-cubic-foot batch was used, having the following average weights:

Cement	812 lbs.
Sand	1,622 lbs.
2B stone	1,402 lbs.
3A stone	1,390 lbs.
Water	33½ gals.

The air content in the mix held between 3.1 and 3.4 per cent, and the slump averaged around 1¾ inches. The amount of water used did not exceed 5.3 gallons to the bag of cement. The cement factor per cubic yard of concrete was 6.25 bags. The gradation of the sand and two sizes of stone is as follows:

Sieve Size	Per Cent Passing		
	3A stone	2B stone	Sand
2½-inch	100	....	....
2-inch	90-100	....	....
1½-inch	35-70	....	....
1¼-inch	....	100	....
1-inch	0-15	90-100	....
¾-inch	....	....	....
½-inch	....	20-50	....
¾-inch	....	....	100
No. 4	....	0-10	90-100
No. 20	....	....	40-75
No. 50	....	....	10-30
No. 100	....	....	1-8

Paving Preparations

The contractor brought 6,000 linear feet of Blaw-Knox forms to the job, and always kept at least 500 feet on both sides to line and grade ahead of the paver. Form trenches were dug by a Cleveland Formgrader; the forms were set and the pins driven with an Ingersoll-Rand air hammer powered by a Worthington 60 portable air compressor. Paving was done full width, with the forms 24 feet apart. Excess material was thrown off by a Buckeye Power Finegrader, and the grade was rolled by a Huber 3-ton 3-wheel roller and checked with a scratch template.

Joints were then installed between the forms—contraction joints at 46½-foot intervals and expansion joints every 900 feet plus/minus. Bethlehem joint assemblies and steel reinforcing were employed. The contraction joints are 14-gage steel strips, 3/32 inch thick, which are left ½ inch lower than the top of the 9-inch slabs. They are capped with steel channels and hold 1 x 24-inch dowels on 12-inch centers. They come in two sections, each 12 feet long.

The expansion joints have a ¾-inch fiber strip which comes to within ½ inch of the surface of the concrete. It also holds 1 x 24-inch dowels on 9-inch centers. Along the center line are 5/8 x 48-inch longitudinal dowels on 5-foot centers, supported on each side by a pin. The subgrade was wet and the forms were oiled. Every other dowel on alternate sides of the contraction joints were also oiled.

Concrete Operations

The mixed concrete was placed in front of a Blaw-Knox paddle-type spreader which leveled it off 3 inches below the top of forms. Two blocks or slabs totaling 93 linear feet were laid in this manner, the mesh reinforcement was set in place, and the paver backed up to deposit concrete on top of the steel and thus fill up the forms. As the concrete was placed it was spaded at the joints and along the forms. Behind the spreader came a Blaw-Knox dual-screed finishing machine which made two passes over the concrete, and a Koehring Longitudinal Finisher.

This was followed by a Flex-Plane machine from which were inserted 5-foot strips of steel into the center line of pavement. The strips were 2½ inches deep x ¼ inch in width, and interlocked with each other. They were pushed down into the concrete so that their tops were ¼ inch below the surface. The surface of the concrete was then floated from each side with hand floats made

(Concluded on next page)



load limits on the highway—handle with the same ease and speed as conventional units.

Plenty to keep drivers happy too! Synchro-Mesh transmissions, easy-working cushion-disc clutches, famous "Easy-Turn" recirculating ball-bearing steering gear, power brakes, and roomy lifetime cabs—all make these high-powered hustlers a cinch to handle.

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Paving Job Typical Of Work on Turnpike

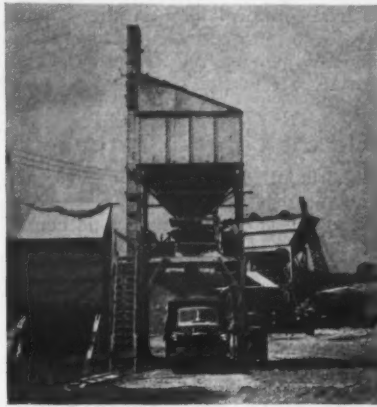
(Continued from preceding page)

from a 6-foot length of 2 x 6 attached to a long handle. It was then checked for level with a 10-foot straightedge.

After this the caps were pulled from the transverse joints and the steel strips from the longitudinal joint along the center line. This was done from a 4-wheel bridge. The surface of the concrete was smoothed over with a 3-foot length of burlap reaching across the full width of pavement. Joints were edged with a 1/16-inch-radius tool along the center joint, a 1/4-inch-radius tool for the transverse joints, and a 3/4-inch-radius tool along the edges of the slabs. The tool for the transverse joints had double edges for uniform smoothness.

Curing Methods

The surface of the concrete was then covered with strips of burlap which were kept wet for 24 hours. Instead of



C. & E. M. Photo
That's a Butler cement bin in the foreground, and a Blaw-Knox 3-compartment aggregate bin in the background—part of Langenfelter's concrete set-up.

employing the customary bridge from which to stretch the burlap across the pavement, the contractor took a Flex-Plane machine, formerly used for applying a curing spray compound. This self-powered unit saved considerable time and labor. Enough burlap strips for a day's pour were easily carried in neat piles. Two men unloaded and placed the strips as the machine moved slowly along over the form rails.

As the burlap was put down it was soaked with water from a 1,000-gallon tank truck equipped with a 14-foot spraybar containing 8 nozzles projecting from the side. The truck rolled along the side of the pavement on the 10-foot median strip. As the pavement has a straight slope of 4 inches in 24 feet from inside to outside edges, the entire slab was readily covered with water. After 24 hours the burlap strips were quickly picked up and placed back on the Flex-Plane machine. The concrete was then covered with Sisalkraft paper which was left in place from 48 to 72 hours, depending on the weather. One 24-foot strip covered the surface, and a 2-foot strip along each edge protected the sides of the slabs.

After the paper was removed, the joints were poured by a subcontractor, the Waco Construction Co. of Baltimore, Md. Sealz, a rubber compound, was heated to 400 degrees F in a special type of U. S. Rubber Co. heater, and then poured into the transverse and longitudinal joints.

With a force of 50 men the contractor averaged 1,300 linear feet of 24-foot pavement, 9 inches thick, in a 10-hour day. To make sure that the finishers had sufficient light as the days shortened toward the end of the job, several

Universal 5-kw light plants were made available. The light towers were mounted on rubber-tire carriages which were easily pulled about.

During the pouring of the second 24-foot lane, the paver was operated over the roadway that was already finished. The 30-foot boom on the Rex paver was long enough to reach across the median strip and drop the batches between the forms on the other side. The paddle-type spreader distributed the concrete evenly over the subgrade. Until the new span over Swatara Creek was finished, the batch trucks used a near-by town bridge to service the paver when it was working at the west end of the project.

Quantities and Personnel

The major items in the 4.7-mile turnpike contract included the following:

Class 1 excavation, roadway	665,000 cu. yds.
Reinforced-concrete pavement, 9-inch	127,000 sq. yds.
Class 2 excavation, structures	24,000 cu. yds.
Class A concrete	4,000 cu. yds.
Class B concrete	6,000 cu. yds.
Plain steel bars	863,000 lbs.
Fabricated structural steel	501,000 lbs.
Special subgrade	209,775 sq. yds.

C. J. Langenfelter & Son, Inc., was represented on the contract by B. G. Woolfolk, General Superintendent, with H. C. Foster Superintendent on the grading and drainage, and John Woolfolk Superintendent on the paving.

For the Pennsylvania Turnpike Commission, this contract was under the supervision of George T. Chapman, District Engineer of the Philadelphia Extension District No. 4, with headquarters at Highspire. There are two other districts covering the work of the eastern extension. E. R. Painter was Resident Engineer on this particular project. The Commission is headed by T. J. Evans, Chairman; R. B. Stone is Chief Engineer.

New Lull Sales Manager

Herbert C. Lull has been appointed Sales Manager of the Lull Mfg. Co., Minneapolis manufacturer of allied equipment for wheel tractors and of material-handling units. He used to be with General Motors Corp.



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Black-Top Paving For City Streets

A State Maintenance Project Improves Two U. S. Routes in Fort Wayne, Indiana, With Hot Plant-Mix

THE State Highway Commission of Indiana last year repaved portions of U. S. 24 and 27 through the city of Fort Wayne as part of its maintenance program. The work was done through contract by the Brooks Construction Co. of Fort Wayne for \$145,050, and consisted of laying two courses of bituminous concrete on the city streets carrying the Federal routes.

Three streets were thus improved. U. S. 24, east-west route through the city, is carried on two one-way streets paralleling each other a block apart. West-bound traffic uses Washington Street, and the east-bound uses Jefferson Street. Intersecting them in the center of town is north-south Clinton Street, designated U. S. 27. On Clinton Street the resurfacing extended from city limit to city limit, a distance of 3½ miles. The east-west improvement on both one-way streets totaled 2¼ miles, a mile on Jefferson Street and 1¼ miles on Washington Street.

The width of the paving improvement varied from 22 to 60 feet, and at intersections the paving extended back to the building lines of the streets under construction. The east-west streets averaged 42 feet, and the plant-mix was usually laid in two 9-foot lanes at the center, and a 12-foot lane along each curb. In general, the work on Clinton Street consisted of five 10-foot lanes.

Covers Old Pavement

The original pavement was either sheet asphalt or rock asphalt laid on a binder base. This had been in service for a good many years and was in need of replacement due to its cracked and broken condition. Most of the break-up occurred in the center of the street, while the lanes bordering the curbs were in fairly good condition, being occupied generally by parked cars and getting little traffic use. In such cases the binder course was laid only in the center where the street was subjected to the greatest wear. The surface course then covered both the new binder and the old pavement at the sides. Elsewhere the binder and surface courses were laid over the entire old pavement.

To put these important arteries in shape as soon as possible after the winter, the binder was laid in the spring, while the surface course was put down later in August and September. When compacted the binder material varied from 1¼ to 2 inches in thickness, while the surface course was from 1 to 1½ inches in depth. An inch of compacted paving weighs around 110 pounds to the square yard.

The bituminous concrete came from the contractor's own commercial plant located on the southern outskirts of Fort Wayne, a 5-mile average haul to the job. The plant is a Hetherington & Berner 1-ton pugmill unit. Aggregate for the mix consisted of sand and limestone. The sand came from the W&W pit at Roanoke, Ind., while the crushed limestone was supplied by the Erie Stone Co. of Bluffton, Ind. Mineral filler, which was added to the surface course, was furnished by the France Stone Co. of Greencastle, Ind. The Texas Co., from Lawrenceville, Ill., shipped in the AP-50 asphalt, which has a 60-70 penetration, used in the binder and surface course.

The composition of the binder-course mix conformed to the following:

Sieve Sizes		Percentages	
Passing	Retained	Minimum	Maximum
1-inch	¾-inch	5	50
¾-inch	No. 4	10	60
No. 4	No. 6	0	5
No. 6	No. 8	0	5
No. 8	No. 16	3	12
No. 16	No. 50	5	20
No. 50	No. 100	2	4
No. 100	No. 200	0	3
No. 200		0	
Total retained on No. 6		60	70
Bitumen (60-70 penetration)		4	6

The composition of the surface-course mix met the following limitations:

Sieve Sizes		Percentages	
Passing	Retained	Minimum	Maximum
¾-inch	¾-inch	2	14
¾-inch	No. 4	20	50
No. 4	No. 6	0	11
No. 6	No. 8	0	11
No. 8	No. 16	5	20
No. 16	No. 50	10	25
No. 50	No. 100	2	17
No. 100	No. 200	1	5
No. 200		3	5
Total retained on No. 6 (filler)		45	55
Bitumen (60-70 penetration)		7	7

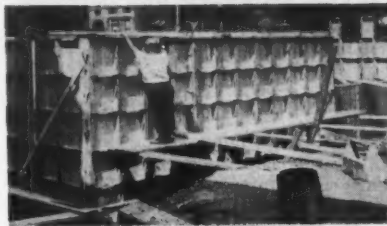
Laid by Paver

The hot-mix was hauled from the
(Concluded on next page)

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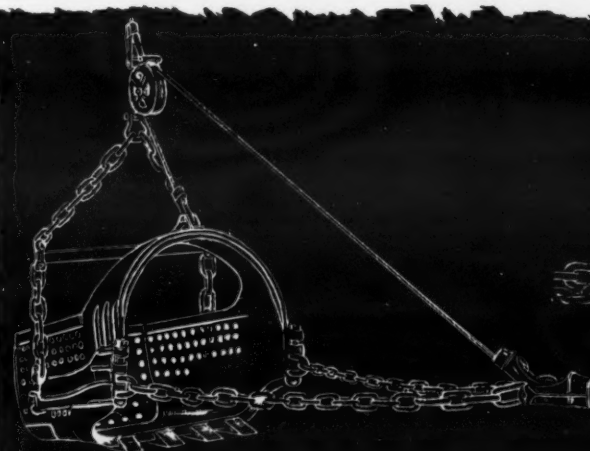
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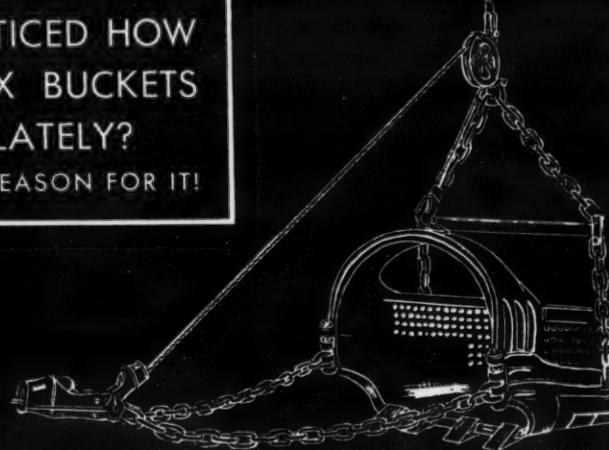
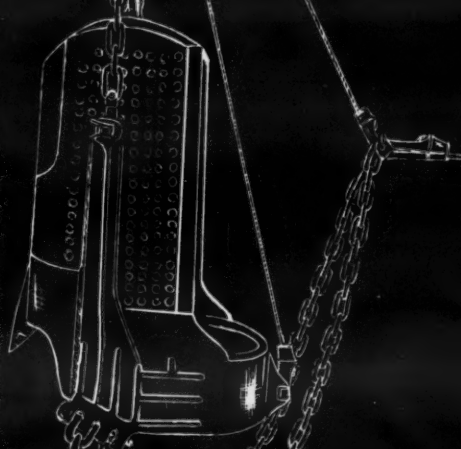

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MANSFIELD - LOUISIANA

Black-Top Repaving For Fort Wayne Streets

(Continued from preceding page)

plant by a fleet of five trucks holding 6 tons apiece. The contents were covered with tarpaulins to keep the temperature around 275 to 300 degrees F. All the paving was done with an Adnun Black Top Paver. Prior to the paving the street was given a tack coat of AE-150 asphalt emulsion, applied at the rate of 0.10 gallon to the square yard, by a South Bend 1,100-gallon distributor mounted on an International truck. The emulsion was cold when applied.

Behind the paver the mix was compacted first by a Buffalo-Springfield 10-ton tandem roller, and then by a Galion Chief 10-ton 3-wheel roller. Traffic was maintained at all times over the portion of the street not actually being paved.

Quantities and Personnel

Three major items were included in the maintenance paving contract. They are:

Bituminous prime	27,000 gals.
Bituminous concrete binder (AH)	11,200 tons
Bituminous concrete surface, Type B	11,200 tons

The Brooks Construction Co. employed a force of 12 men on the project—4 at the asphalt plant and 8 on the street paving operations. Frank LaBarbera was Superintendent.

For the Indiana State Highway Commission, Larry G. Myers was Project Engineer. The Commission is headed by Samuel C. Hadden, Chairman, while Earl B. Lockridge is Superintendent of Maintenance.

Pocket-Size Meter For Current Reading

A new pocket-size volt-ammeter specifically designed for maintenance men, engineers, electricians, and motor repair and service shops is available from the Pyramid Instrument Co., 49 Howard St., New York 13, N. Y. It is hand-held and measures $7\frac{1}{2} \times 2\text{-}9/16 \times 1\frac{1}{2}$ inches. The split-core transformer will handle conductors up to $1\frac{1}{2}$ inches in diameter. The transformer core is permanently insulated with a molded plastic cover capable of withstanding 5,000 volts, the company says. The case, too, is insulated for complete protection.

The scale is visible from any angle, and the range is clearly indicated. The movement is a large D'Arsonval jeweled movement with an alnico magnet, and is dust and moisture-proofed. A plastic finger trigger opens the jaws, and the selector switch is operated with a flip of the finger at the base of the meter. Pyramid states that the unit has an accuracy of plus or minus 3 per cent of full scale.

The meter is available in three models, each measuring 5 current ranges and 2 ac voltage ranges. The Model A-5 covers the 5.6, 13, 26, 65, and 130-amp ranges and 130 to 260-volt ranges. The Model A-5-1 has the same current ranges but a 150 to 600-volt range. The Model A-6 meets the 10, 25, 50, 100, and 250-amp current ranges and the 150 and 600-volt ranges.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 122.

Paving Program for Colombia

The Highway Department of Cundinamarca, Colombia, is beginning a 3-year highway paving program which will cost an estimated \$20,000,000 (U. S.). The program involves the paving of 508 kilometers of roads, one-fifth of the total to be paved with asphalt and the rest with concrete. Equipment required for the project will cost approximately \$1,000,000 (U. S.). This sum the Department expects to get from the Export-Import Bank, which

has provisionally approved a loan.

Christian Neilsen Co., Denmark, has been appointed engineering advisor, and arrangements have been made for three U. S. firms, with affiliated companies in Colombia, to do the paving. The firms are Winston Bros., Morrison-Knudsen Co., Inc., and the Utah Construction Co.

Sprayers for Weed Control

A series of folders describing sprayers for roadside weed control have recently been offered by the Essick Mfg. Co., 1950 Santa Fe Ave., Los Angeles 21, Calif. Fully illustrated, the literature points out that the Essick sprayers may be fitted with booms for various types of terrain and for passing obstacles; that they may be trailer or Jeep-mounted, and that they can be used for spray painting, fire fighting, and similar applications.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 92.

Catalog on Specialties For Construction Work

A 24-page catalog on specialties for various types of construction work has been prepared by the Dayton Sure-Grip & Shore Co., Miamisburg, Ohio. The products described include a wide

variety of form ties, anchor slots, beam and column wrappings, hangars, anchors, malleable inserts, floor and wall plugs, corrugated brick ties, soffit spacers, and slab graders.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 128.

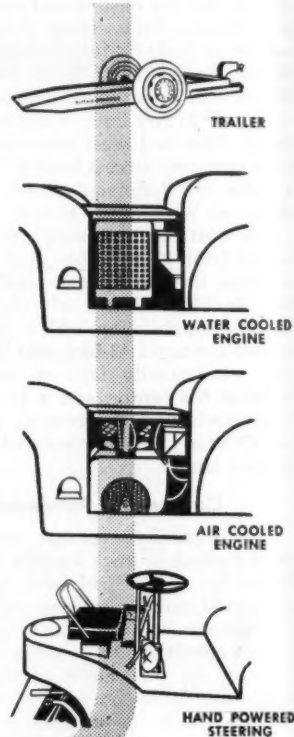
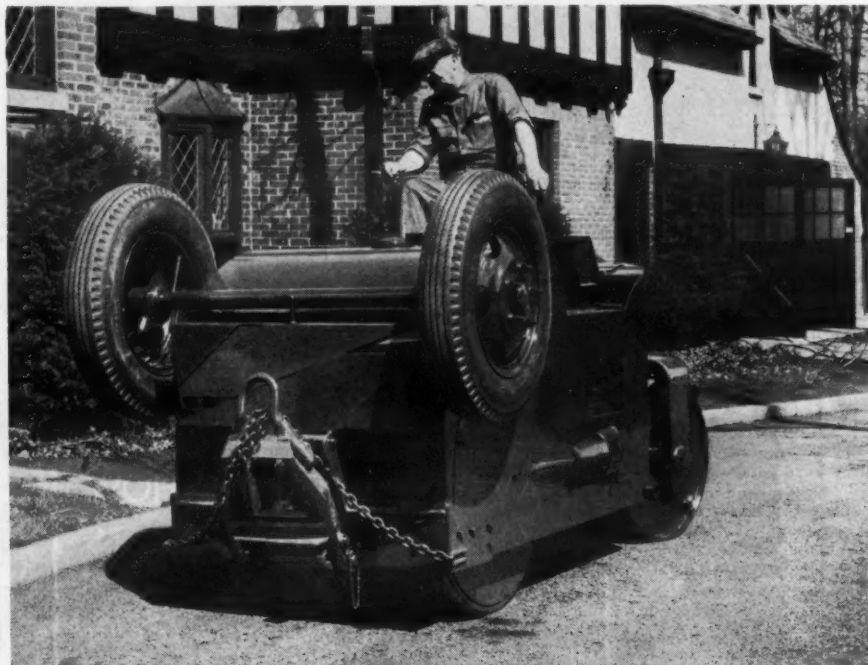
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One Roller for 1000 Jobs!

That's a lot of work for a small roller—but Republic Asphalt Paving Company of Dayton, Ohio, completed exactly this volume of work during the 1949 season with their Buffalo-Springfield model KT-7, 3 to 5 ton tandem.

Used for patch work, driveways, parking lots and other small constructions, the KT-7 was quickly transported from job to job on its low-bed trailer. Now more portable than ever, when equipped with road wheels and husky towing attachment, the KT-7 can be completely rigged for hauling by one man in less than three minutes.

Available with either water-cooled engine and

hydraulic steering or air cooled engine and hand powered steering, this unit is easily maneuvered in the most restricted areas. A shovel opening in the drive roll head permits the use of wet sand as ballast and accounts for the wide range of working weights attained with this small roller.

If you have a variety of smaller rolling jobs in widely-scattered locations, you can cut lost time between jobs and save working time on the job with this rugged, economical and easily maintained heavy-duty roller. Your nearest distributor can furnish detailed information on either the Model KT-7 or the smaller $2\frac{1}{2}$ to 3-ton Model KT-6. Call him today.

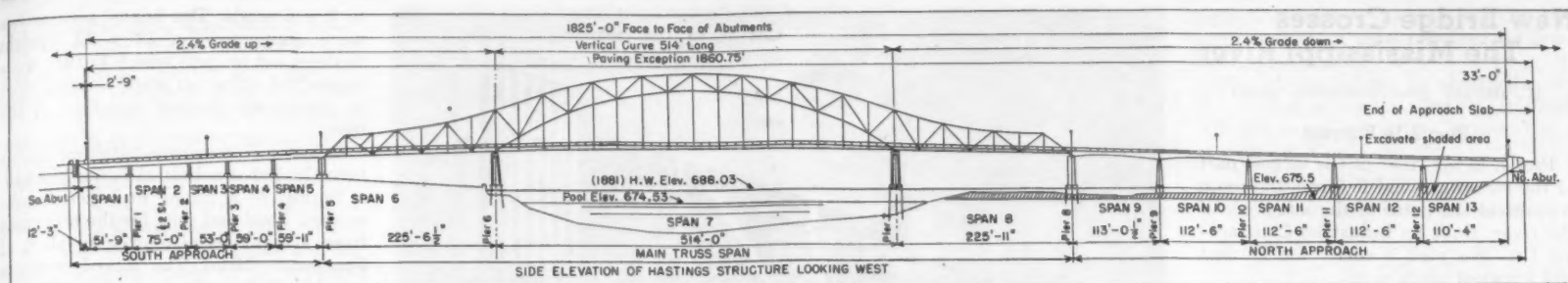
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New Bridge Crosses The Mississippi River

Steel Tied-Arch Crossing to Replace Old Spiral-Approach Structure at Hastings, Minn.

By **RAYMOND P. DAY**,
Western Editor

† FIFTY-FOUR years ago, when Wisconsin Bridge & Iron Co. finished the famous spiral-approach steel bridge across the Mississippi River, people thought it would last for all time. They little dreamed that the automotive age would make a shambles of the old wood deck, or that the fancy spiral approach on the Hastings side would become a dangerous traffic bottleneck. They didn't realize that the constant hammering vibration of passing loads would loosen rivets and weaken members of the structure.

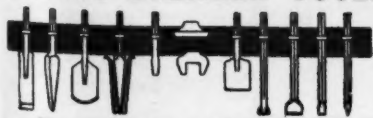
But time, destroyer of most material things, has rendered the famous old bridge obsolete. A new one is now being built by the Minnesota Department of Highways to take its place. The new 1,825-foot tied-arch steel and concrete structure will have straight approaches and a roadway 32 feet wide. In time it, too, may be outmoded, but it will be a long time in the future.

The new bridge is being built under a series of five state contracts. Contract 1, with S. J. Groves & Sons, has been completed. It called for the partial construction of the north approach fill. The second contract called for construction of piers 5 to 12 and the north abutment, together with some storm-sewer work near piers 5 and 6. This contract, awarded to Industrial Contracting Co., of Minneapolis, involved the large and difficult piers near and in the river.

A third contract has also been let to Clinton Bridge Works, of Clinton, Iowa, for the structural-steel work. This \$924,672 job started in October and carried through the winter.

The fourth contract, at \$356,600 was let to Graus Construction Co. of Hastings. This job is now moving rapidly, and about 5 months after Clinton finishes with the steel, Graus will also be done. This is expected to be near the end of the 1950 working season. The Graus contract calls for construction of the south abutment, stairway, piers 1 to 4, spans 1 to 5, the north approach slab, and the concrete floor and sidewalk on spans 6 to 13. It also includes the furnishing and installation of all ornamental bridge railing, traffic and navigation lights, and completion of the drainage system.

"BICKNELL BETTER BUILT" PAVING BREAKER TOOLS



We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.

Write for descriptive circular

BICKNELL MANUFACTURING CO.

12 LIME STREET ROCKLAND, MAINE

The new bridge substructure has been taking shape rapidly, since both Graus and Industrial Contracting Co. worked at a fast pace.

Bridge Design

Known as a tied-arch structure, the

bridge was planned initially by the St. Louis firm of Sverdrup & Parcel, with additional design by the Minnesota Department of Highways. From face to face of abutments, the bridge is 1,825 feet long. It consists of a structural-steel top and 5 reinforced-concrete deck girder spans on the south end.

Both the north and south anchor arms are 224 feet 10½ inches long. The center tied arch is 514 feet long. The north spans beyond pier 8 consist of deck plate girders covered by a reinforced-concrete deck.

The south abutment and piers 1 through 6 (see drawing) rest on a bedded limestone foundation. Pier 7, which is the only one to be built out in the Mississippi River, will rest on 324 Douglas fir bearing piles, 60 to 85 feet long and capable of supporting 30 tons. In this one pier alone there are over 4½ miles of pile driving.

Piers 8-11 all are supported on wood piles, while the north abutment rests on Armco spiral-welded cast-in-place piles.

(Continued on next page)

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Terrific Power in Every Drop!



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—is now better than ever, too!

Gulf Oil Corporation • Gulf Refining Company

New Bridge Crosses The Mississippi River

(Continued from preceding page)

Pier 7 Is Biggest

Pier 7, in the river, is the largest part of the structure, and it forms the main support at the point of the left bank of the river. Built by Industrial Contracting Co., this pier is easily the hardest and trickiest piece of all.

The substructure of the pier was constructed inside a steel sheet-pile cofferdam 85 x 40 feet in size. The cofferdam piles were AP-type steel, 60 feet long, and were driven about 51½ feet deep below the surface of the river. This put them at least 15 feet below the concrete seal.

An American stiffleg revolving derrick was used for the construction of this pier and several others nearby. It had a 40-hp steam boiler, a 90-foot boom, and rested on wood piles capped by 12 x 12's.

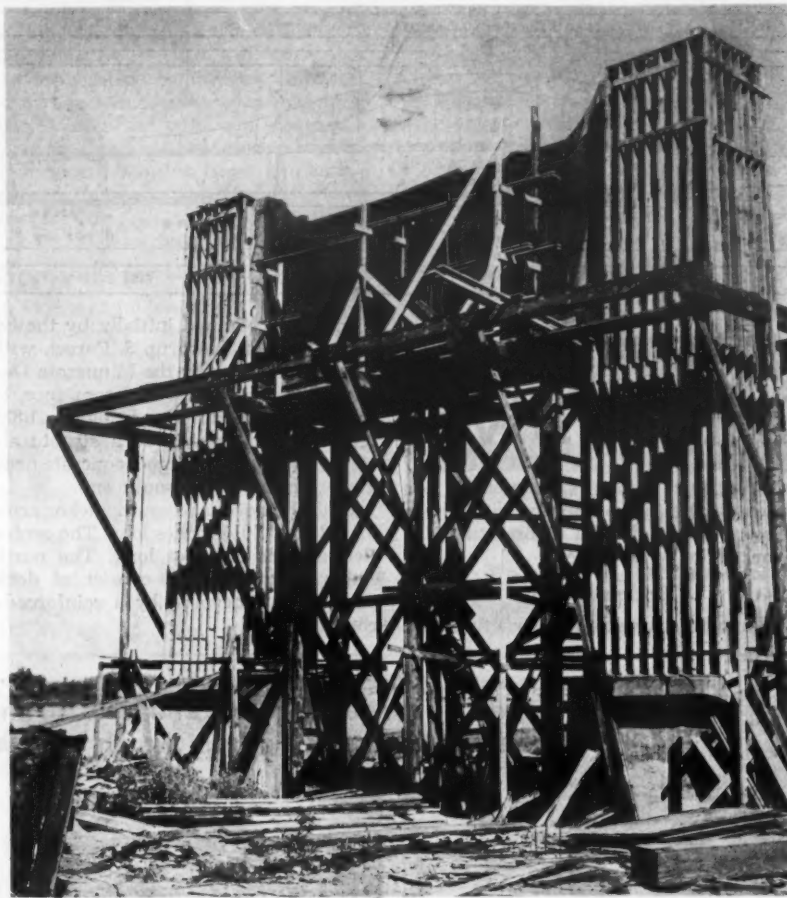
The AP-type sheet piles were driven around a heavy timber template. Special corner sections were used to change direction at the four corners. The sheet piles were kept plumb while they were being driven, so the river sand made easy driving, and practically all of the pieces went down to project depth without having to be cut off. A Union 1½A pile hammer did the driving.

The inside of the cofferdam was braced against the external pressure of the river, which came to bear with full force, when the water and sand were all removed to foundation depth. Altogether there were five sets of steel rings and one timber frame made of 12 x 12's, which is nearest the top.

The lower four steel ring frames consisted of 14-inch WF 87-pound structural steel, with 12-inch WF 40-pound steel for all main struts, which were on 15, 17, and 18-foot centers. Longitudinal struts were 8-inch WF 31-pound. The top steel frame consisted of 14-inch WF 43-pound steel, with the same strut construction as the other lower frames.

As each frame was erected, it was suspended at eight points on large 2½-inch screw rods, which passed through double 12 x 12's and a set of caps laid across wood bearing piles. The frames were lowered in place as each set was finished. As the water and sand were removed, the cofferdam tightened up on the steel rings.

The rings were assembled in such a way that the sand could be clammed out by the derrick, water could be removed, and the location of all bearing piles reached easily. The piles were driven to grade under water and a concrete seal was then poured. The cofferdam was pumped out by several 6 to



C. & E. M. Photo
Pier bracing, forming, and shoring details for the new tied-arch bridge across the Mississippi at Hastings, Minn.

8-inch pumps, and the piling cut off to grade. The rest of the structure could then be poured in the dry. The bracing struts remain in the concrete, and all but the top 30 feet of the cofferdam also remains in place as a protection against scour. The Mississippi River channel at that point is 38 feet deep, situated as it is between two sets of locks, and the bottom of the pier is about on a line with the bottom of the channel.

Other Piers Easier

Construction of the other northward piers was somewhat easier, but each had to be protected by a steel sheet-pile cell, which was driven either by the stiffleg derrick or by a Browning truck crane with a 65-foot boom. After the foundation concrete, beam, and elliptical column sections were above ground, the steel sheeting was extracted at once and moved to the next pier. The sandy soil and ground water presented no particular problem, and the north piers were dewatered usually by only one 4-inch centrifugal pump.

to 2 x 6 studs. The heavy pier arches were supported by 12 x 12 upright timbers, set on caps which in turn were supported either on wood bearing piles or previously poured concrete at the base.

Industrial's concrete-batching equipment included a Heltzel batch bin with a Smith 27-E paver and two truck-mixers. Sand and rock for the mix came from a commercial aggregate plant at Frontenac, Minn. The mixed concrete was handled to the pours by a 1-yard transfer bucket and the Browning truck crane.

The concrete was cured by a constant spray system, with water from the near-by river. A small Rex centrifugal pump supplied the sprinkler heads to keep the concrete wet. Industrial Contracting Co. finished its \$440,000 contract about November 1, 1949, a year after it started its part of the project.

Graus Has Hastings End

The Graus work is a little unusual for the firm, because it is the first time in many years that it has landed such a large project right in its own backyard. Hastings is home to W. C. Graus, President of the firm, and he is seeing to it that the reputation of his company is enhanced through the excellence of the work.

Graus, too, has been busy on substructure work, until the concrete slab on the deck could be constructed. The work at the time the job was visited consisted of the construction of piers, street pavement widening, and so on. A carpenter yard was set up in Hastings' main street, where all the concrete forms were built and erected.

The bridge design is so simple and

(Concluded on next page)

Form work for the Industrial Contracting Co. part of the work consisted of plywood panels ¾ inch thick, nailed



STOPS MOISTURE FROM FALLING INTO TRACTOR EXHAUST... Just slip the "RAINCAP" over the open end of your tractor exhaust, and you eliminate forever the danger of moisture falling into the exhaust, injuring your tractor. THE CAP THAT DOES NOT FORGET TO CLOSE... Completely automatic—the "RAINCAP" is counter-balanced to open when the tractor starts and close when it stops. Rust proof—made of cast aluminum with bronze bushing—can be installed in two minutes. F.O.B. Waterloo, Iowa.

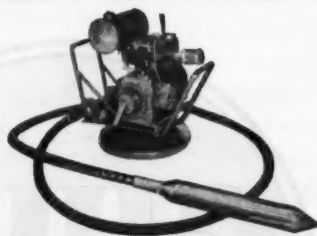
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55	2"	1.90
5x	1 3/4"	1.90
6	1 1/2"	1.90
66	1 3/8"	1.90
7	2 1/2"	1.90
8	3"	2.50
9	3 1/8"	2.50
10	3 1/4"	2.50
11	3 1/2"	2.75
115	3 3/4"	3.00
12	4"	3.00
123	4 1/8"	3.00
125	4 1/4"	3.00
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White Concrete Vibrators Have Many Noted Features

which have made them highly successful all over the world.

DEPENDABLE FLEXIBLE DRIVE. All sections interchangeable, in multiples of 7' and 12' lengths. No special sections required. Each casing has ball-bearing connector. Each alloy steel core has slip joint which does not separate. It prevents stretching and overheating. No limit to length of drive.

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applied to any drive section. Heads can be opened for repairs. Rotor mounted on double ball or roller bearings. Alloy steel external ribs reduce wear.

STANDARD POWER UNITS. Well-known gasoline engines and electric motors. Can be serviced almost anywhere.

CONCRETE GRINDERS. Speed reducing heads, to hold grinding wheels, can be attached to any drive section.

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INDIANA

well suited to good construction practices that pier forms could be used over and over. For the pier tops are all identical. The higher piers were built with forms that were used on lower ones, simply by extending the base section.

All form panels on Graus' work consisted of $\frac{5}{8}$ -inch structural plywood, nailed to 2 x 6 studs on 12-inch centers or less. All wales were double 2 x 6's, and the exterior grain of all plywood surfacing was at right angles to the studs. Williams steel form clamps were used, with $\frac{3}{8}$ -inch inside threaded tie rods, which have a working load rating of 7,200 pounds each. All inside tie rods are 3 inches shorter than the width of the piers.

All studs were either continuous, lapped, or scabbed, and radius forming was blocked to the falsework. The up-rights under Graus' piers were 6 x 6's, with 6 x 10 strongback caps and 2 x 8 cross bracing, all of bolted construction. All this timber was new structural-grade Douglas fir.

Graus hauled truck-mixed concrete from the Certified Concrete Co. of Minneapolis, a distance of about 25 miles from the project. Due to labor strikes, there were a few times when this company was unable to supply the material, and in these cases it was hauled about 23 miles from a commercial plant in Red Wing.

The maximum pouring rate was 7 feet per hour, and the concrete was thoroughly vibrated as it went in the forms. The truck-mixers discharged their loads to a 1-yard transfer bucket, which was then handled to the pour by a crane. Concrete on the Graus contract was also water-cured, and the piers in the city of Hastings were given a Carborundum stoning after the forms were stripped.

Personnel

The project was designed and administered under the general supervision of O. L. Kipp, Chief Engineer of the Minnesota Department of Highways, with M. O. Giertsen as Bridge Engineer and Howard S. Burkholder as Resident Engineer.

C. E. Foss was supervising field operations for Industrial Contracting Co., and Graus' operations are under the personal supervision of W. C. Graus, assisted by Frank Cahill as General Superintendent.

Simplified Accounting For Contractors, Builders

Mechanized accounting methods for builders and contractors are highlighted in a new booklet, "Blueprint for Figure-Fact Efficiency," prepared by Remington Rand, Inc., 315 Fourth Ave., New York 10, N. Y. In illustrated problem-answer style, the booklet indicates that error-free bid preparation can be achieved with Remington Rand's printing calculator. The machine is designed for the builder or contractor who wants to minimize office figuring work and create more time for productive activity.

The booklet features the printed proof of accuracy provided by the machine in preparing contractor payrolls, figuring cubic content, supplying data for compensation and government re-



C. & E. M. Photo

This is one of the south piers on the new Mississippi bridge, and was built by the Industrial Contracting Co. of Minneapolis, Minn.

ports, and in checking invoices. It points out that anyone can use the printing calculator after a short demonstration. The machine's fast, simple 10-key key-

board does not require expert office-machine knowledge for use in figuring hourly rate bases and salary basis with overtime, or for computing and printing

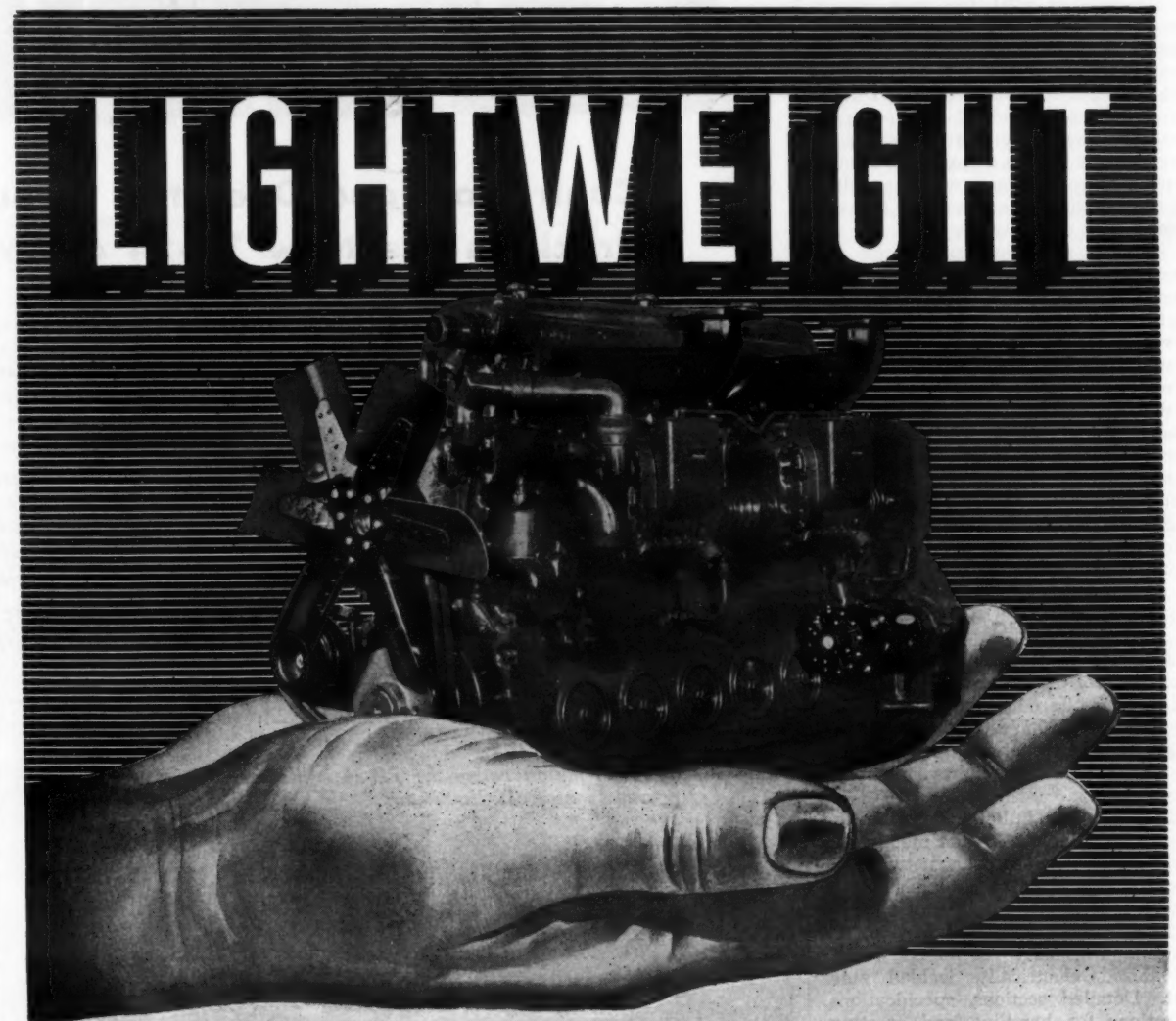
payroll envelopes bearing all the income-deduction data required by law, Remington states.

This literature may be obtained from the company by requesting Booklet AD-416, or by using the Request Card at page 16. Circle No. 105.

Surveying Instruments

A new 36-page booklet on a complete line of surveying and drafting instruments for the engineer and contractor is available from The L. S. Starrett Co., of Athol, Mass. Included in the listing are pocket tapes, case tapes, frame tapes, oil-gaging tapes—in both English and metric graduations—refills, tape wipers, and tape hooks. Also included are Starrett precision leveling instruments, transits, and draftsmen's tools. Illustrations, descriptions, specifications, and price lists are given for each of the products.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 73.



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Now, for the first time, a line of diesel engines in which all major castings are of rugged design for the toughest jobs... proved performance. And longer life, too! Write for literature. Diesel Division, Harnischfeger Corp., Port Washington, Wis.



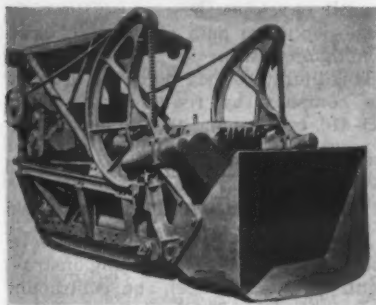
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Attached to Tractors, Bulldozers, Motor Graders and Scrapers, the Automatic Slope-Meters are in use on the construction of highways, airports, dams and building sites. Slope-Meters are compact, sturdily constructed instruments that will automatically show the operator the exact grade or slope on which he is working.

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From digging position to discharge and back to digging again takes 10 to 15 seconds with the Eimco 104 RockerShovel. It has a loading capacity of 4 to 6 yards per minute.

New Overhead Loader

A new overhead shovel loader has recently been engineered by the Eimco Corp., 634 S. Fourth West St., Salt Lake City 8, Utah. Designed for use as a shovel, loader, or bulldozer, the 104 RockerShovel may be powered by a 48-hp diesel engine or a 30-hp electric motor.

The unit is available with bucket capacity from 1 to 2 cubic yards. The company recommends the 1-yard bucket for heavy ore, a 1¼ for rock, a 1½ for light rock and earth, a 1¾ for sand and gravel, and a 2-yard for snow loading. The RockerShovel has a loading capacity of 4 to 6 yards per minute with a 10 to 15-second cycle, according to the manufacturer. It has five forward speeds and one reverse.

There is a single control lever for bucket operation. The straight forward and backward motion of the unit is designed to eliminate the necessity of turning around to dump. The main-frame assembly is of heavy structural steel electrically welded. The bucket-elevating mechanism consists of Eimco rocker arms rolling on heavy high-carbon-steel rails, raised by link-type power chains and an automatic accelerating reel.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 45.

Roof-Decking Materials

A series of technical bulletins describing roof-decking materials has recently been offered by the United States Gypsum Co., 300 West Adams St., Chicago, Ill. These materials are designed to provide a strong, lightweight, fire-proof roofing.

The first of the bulletins describes the 2-inch x 15-inch x 10-foot metal-edge Gypsum plank, a precast structural roof deck reinforced on all four edges with galvanized sheet steel, formed into tongues and grooves. In addition, the plank is internally reinforced with a galvanized electrically welded steel mat. Detailed sections, specifications, directions for handling and erecting, and features of the product are included.

A similar pamphlet describing the 3-inch x 12-inch x 30-inch short-span (nailable type) Gypsum roof tile is also offered. This product is a precast, solid, reinforced Gypsum roof deck unit, usually supported by steel tee sub-purlins. A grouting groove along the top edge is provided. Though these tiles are designed especially for pitched roof decks they are also adaptable to flat or slightly curved surfaces.

The third bulletin describes Sheet-rock and Weatherwood Pyrofill roof deck. These decks, the literature explains, are reinforced Pyrofill (gypsum concrete) slabs poured in the field using Sheetrock (Gypsum board) or Weatherwood insulation board for permanent forms. Erection details, specifications, applications, limitations of use, and features of this construction are included in the folder.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 23.

New Portable Beacon

A portable beacon for highway construction and maintenance work has recently been developed by an associated company of the International Telephone & Telegraph Corp., New York City. It produces about 70 flashes a minute, each flash a short one but intense enough to give a good warning signal.

The unit stands 22 inches high, is 8 inches in diameter, and weighs 29 pounds. It consists of a special gas discharge lamp, a simplified pulse-producing unit, a battery, and a lens. It uses a battery of four 1.5-volt dry cells which, under normal operating conditions, are designed to give 6 months of service.

All electrical parts, including battery

elements, are assembled into one unit and placed in a cylindrical welded-steel container. A lid carrying the lens is placed on top of the container and fastened by four screws.

Further information may be secured by writing to the International Standard Trading Corp., an I. T. & T. sales subsidiary, 67 Broad St., New York 4, N.Y. Or use the Request Card at page 16. Circle No. 86.

Macwhyte Transfers Cowan

The Macwhyte Co., Kenosha, Wis., has transferred James Cowan to its Pittsburgh office. As Direct Factory Representative there, he will handle the company's wire-rope sales in part of Pennsylvania and New York State.

Magnesium-Frame Forms

A new 14-page illustrated booklet featuring plywood forms in magnesium frames has recently been released by Symons Clamp & Mfg. Co., 4251 Diversey Ave., Chicago 39, Ill.

It explains that the plywood edges are completely protected by the magnesium frames. The plywood-faced panels are 2 feet wide and are made in lengths of 4, 6, 7, and 8 feet. Fillers are made in any widths required. These units, the catalog points out, are interchangeable with all-magnesium panels. General directions for setting up and caring for the forms are also included.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 107.

CHAMPION of

Contractors and Operators throughout the Country Proclaim the New TD-24 CHAMPION of Crawlers

The International TD-24 has proved itself CHAMPION of Crawlers. On job after job, the new TD-24 has won the admiration of operators for the ease with which it does work which other tractors cannot do. Contractor-owners are equally enthusiastic, for they see the TD-24 outworking and out-producing every other tractor in the field.

Greater power, and the weight and traction to match, plus new operator convenience and ease of control, give the TD-24 much more than an edge over any other tractor you might name.

Experienced operators and owners have this to say about the new TD-24: (names on request)

"In my estimation the TD-24 is the heavyweight champion of crawler tractors."

"The TD-24 works right along on slopes so steep we have to cut them down before other tractors can even navigate unloaded. TD-24's are fast tractors, easy to shift and have plenty of power. This combination really moves dirt... made us more money than any other tractor could."

"The TD-24 is a wonderful piece of machinery and I can't say enough for it. Our operators feel they are wasting their time when they run other tractors, for no other tractor built can compare with the work these TD-24's can do."

Visit your International Industrial Power Distributor and see what the TD-24 can do for you. You'll agree it's the CHAMPION of Crawlers—the one tractor you can't afford to be without, for profitable earthmoving.

INTERNATIONAL HARVESTER COMPANY
Chicago



JOB FOREMAN REPORTS SAVINGS

"It (the TD-24) is definitely outperforming every other tractor on the job," says the foreman on this 247,000-yard stadium bowl job in Maryland. "It will do so much work that we are sure our job costs will show a great saving."



New Surveying Prism

The new Wasatch constant-deviation pentaprism made by the Stratex Instrument Co., 1861 Hillhurst Ave., Los Angeles 27, Calif., is designed to check ground and drill-hole layouts, earth-work mensuration, field inspections, slope surveys, irrigation problems, highway and flood-control routines, foundation layouts, and similar applications involving angles of 90 degrees and multiples thereof. The pentaprisms are unique in that the foresight images are erect and positive.

The Wasatch pentaprism is carried in a "lighthouse" mount, protected by a revolving shutter. Backsight alignment is accomplished by two pairs of V-sights, opposed at 90 degrees to each

other. The backsight is aligned as though the observer were aiming a pistol, after which the foresight appears in the prism at 90 or 270 degrees, depending upon the sights used. The complete instrument is 4½ inches long, and is fabricated of an aluminum alloy. It is furnished with a saddle-leather belt-loop case.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 126.

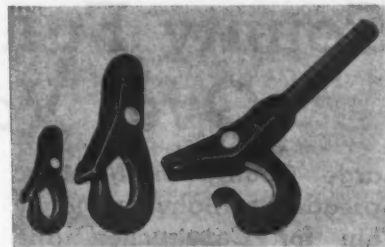
Heavy Equipment Trailers

An 8-page catalog describing heavy-duty equipment trailers has been made available by the Winter-Weiss Co., 2201 Blake St., Denver 2, Colo. Trailers presented in the booklet include the 20 to

30-ton rocker-beam tandem-axle low-bed, the 20 to 25-ton single-axle low-bed, the 20 to 50-ton tandem-axle low-bed and the 30-ton oil-field float. Detailed information is also given on double oscillating bogie axles, trunnion axles, rocker-beam axles, and a front dolly for full trailer conversion.

Detailed descriptions, illustrations, specifications, and features are given for each model. The literature highlights frame construction, the sloping beavertail, loading ramps, brakes, gooseneck design, floor construction, wheels and bearings, and optional equipment that is available.

This literature on Winter-Weiss trailers may be obtained from the company, or by using the Request Card at page 16. Circle No. 43.



Three models of BTC safety hooks. At the left, two eye-bridge styles, one 5-ton and the other 10-ton. At right, a 10-ton hook with a shank bridge.

A New Safety Hook

A new drop-forged safety hoist hook has been announced by the Brewer-Titchener Corp., Cortland, N. Y. Automatic mousing action with a safety-tie lip lock is designed to hold the point of the hook and prevent the sling from slipping off; this tie also adds to the strength of the hook.

The safety-tie mousing automatically engages as the load is applied and disengages when the load is released. This feature is said to eliminate hook-point straightening, the snagging of a hook on ledges, and load slipping or jumping. The patented shoulder and lip-lock construction of the safety tie give ample safety; the pin can be sheared without affecting the load-holding capacity of the hook, the company states.

The new BTC safety hooks are available in 5 and 10-ton capacities. Each comes in two styles—with an eye bridge or with a shank bridge.

Further information may be obtained from the company. Or use the Request Card at page 16. Circle No. 106.

Booklet on Aluminum Paint

A 32-page brochure, "Painting With Aluminum", has recently been offered by the Aluminum Co. of America, 661 Gulf Bldg., Pittsburgh 19, Pa. The new Alcoa booklet points out that while the company does not make or sell aluminum paint, it is interested in explaining how aluminum paints can be used to best advantage. "Every paint with an aluminum 'color'", the company says, "will not necessarily give you the same high standard of performance you have a right to expect."

The booklet notes that aluminum paint is used for metal, concrete, masonry, and similar non-absorbent surfaces; for weather-exposed wood; and for interior heated surfaces and decorative uses. The brochure uses thirty photographs to show applications of aluminum paints. Several pages are devoted to questions and answers and to a table of aluminum paint coverage.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 85.

Hydraulic Hose Assemblies

A set of loose-leaf sheets prepared by the Eastman Mfg. Co., Manitowoc, Wis., provides a complete catalog of hydraulic hose assemblies, couplings, and accessories. These products are designed for use with machine tools, highway and construction equipment, trucks, snow-removal equipment, and repair and service shop machinery. Detailed specifications, descriptions, and illustrations are given for one, two, and three-wire-braid hose, fabric-braid hose, spiral-wire hose, and their assemblies.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 68.

Goff to Represent Onan

Richard Goff is now serving D. W. Onan & Sons, Inc., Minneapolis, Minn., as Direct Factory Sales Representative in the states of Alabama, Arkansas, Florida, Georgia, Mississippi, South Carolina, and Tennessee. His headquarters are in Atlanta, Ga.

Crawlers

"Worth Two of Any Other Heavy Tractor," says Lindsey Belville, president of Greasy Ridge Coal Co., Greasy Ridge, Ohio, strip mine. "This is the best tractor I've ever used in my five years experience," says Warren Bare, the tractor operator shown working it in heavy rock. "It is the only one that will do everything I want it to," he claims.



Standardize on Power this year



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INTERNATIONAL INDUSTRIAL POWER

CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS



County Funds Spread Over Vast Territory

Large County in Montana Spreads Its Highway Money Thin for Construction and Upkeep of 1,500-mile System

By WAYNE W. LINTHACUM, County Surveyor, Big Horn County, Montana

THE familiar old battle a county fights to balance its many miles with little money to maintain them usually results in one of two conditions. Either the county has very poor roads, or it has to use a great deal of ingenuity to spread the money thin and cover the system.

Such is the case of Big Horn County, Montana. Few counties in the nation have so many square miles, so many

road miles, and less income to maintain or construct them. With the county seat at Hardin, Big Horn County lies in the southeastern part of Montana, adjacent to the Wyoming state line near the town of Sheridan.

Big Horn County has an area of 7,500 square miles, extending 72 miles north and south to 120 miles in the east-west direction. The county has 1,530 miles of roads, including the state system. County roads total 21 miles of road-mixed bituminous construction, 400 miles of gravel, 150 miles of scoria shale, and 529 miles of graded earth. Last year's budget, the largest in the history of the county, was only \$120,000. That had to be spread out to cover new construction, repairs, maintenance, equipment, insurance, labor, and incidentals on the road and bridge program.

Economical operation is necessary in order to do good maintenance and program some money for new construction.

Two Sources of Revenue

There are two sources of revenue, the direct property tax and auto registration fees. The license tax brings in about \$20,000, with property tax supplying the remainder. Big Horn County, like others in Montana, is mainly Federal land by virtue of the Crow and Cheyenne Indian Reservations. Since taxes are not applicable to Federal lands, only 32 per cent of the county area produces funds.

From the total anticipated revenue, a budget is made up allocating a certain amount for road maintenance, road construction, bridge maintenance and construction, tools, supplies, and machinery. It is possible to alter a budget at a later period to take care of emergencies, but on the whole the budget is respected. This budget estimate is made up by the County Surveyor with the approval of the Board of County Commissioners.

Funds come indirectly from the soil, for Big Horn County is a livestock and agricultural land. The rolling hills which formerly raised buffalo now furnish forage for cattle and sheep. The flat hill land is used for dry-land wheat farming, and the irrigated river bottoms raise sugar beets, alfalfa, and beans.



Wayne W. Linthacum is the County Surveyor for Big Horn County, Montana.

There are many gas-producing wells in the Hardin area which can supply only a part of the local demand. Some low-grade crude is also beginning to come from a field 40 miles from the county seat.

The Montana State Highway Commission has completed about 15 miles of bituminous and 25 miles of gravel state secondary roads within the county, and performs the maintenance. In addition, the State built 9 miles of farm-to-market road with Federal-Aid funds, which have now been turned over to county forces for maintenance.

Organization

County highway organizations in Montana are controlled by the county commissioners wherever the county has less than 15,000 voters. Commissioners are elected to 6-year terms, with a new commissioner elected every 2 years. The county surveyor is elected to a 4-year term. Present commissioners in Big Horn County include Chairman Andrew Miller, and Members Cary V. Mabe and Clyde Dygert. The writer is County Surveyor.

A general construction and maintenance program is planned each year by the County Surveyor, working with the Commissioners. This program is then adhered to as much as possible throughout the year. The program is scheduled by the County Surveyor in order to obtain the greatest possible use from the men and equipment. Cecil Holland, an efficient maintenance and bridge foreman, directs actual operations at field level and works under the County Surveyor, who is also Highway Superintendent.

The normal number of employees is only 20 in the summer, with 10 through the winter. Although the size of the

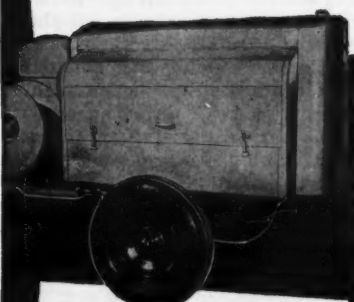
county makes it hard for one foreman to perform his duties properly, work is so scheduled and men are picked for their jobs in such a manner as to eliminate lost motion. Even stormy days are not a total loss, as jobs suitable for inclement weather are always held in backlog for this purpose.

Not Too Much Equipment

The County does not have as much equipment as it would like, but what it does have is seldom idle. Motor graders include a No. 12 and No. 11 Caterpillar, and a Model 99 and 99H Austin-Western. There is a new Koehring 1/2-yard dragline, 8 dump trucks, and a D7-LeTourneau tractor-Carryall combination for loading dirt and making grade changes. A Pioneer 16V portable crushing plant works through the winter months to produce crushed gravel for road surfacing.

Other equipment which comes in handy includes a portable concrete mixer, a chain saw, a backfill tamper, (Concluded on next page)

Bring Compressor Costs Down!



Use the Economical
SMITH 105-P Compressor

The new Smith 105-P will handle the majority of your compressor jobs, for less. Powered with Chrysler's newest and largest Industrial engine—Ind. 15, six cylinders, 4" bore, 5" stroke, 377 cu. in., 3" crankshaft, 7 main bearings, sodium cooled valves and Stellite valve seats for extra heavy duty and long life. Compressor valves are stainless steel disc type with Manganese Bronze seats. Delivers 105 cubic feet per minute. Equipped with improved type-pilot valve and simplified control for efficient, long life with minimum attention.

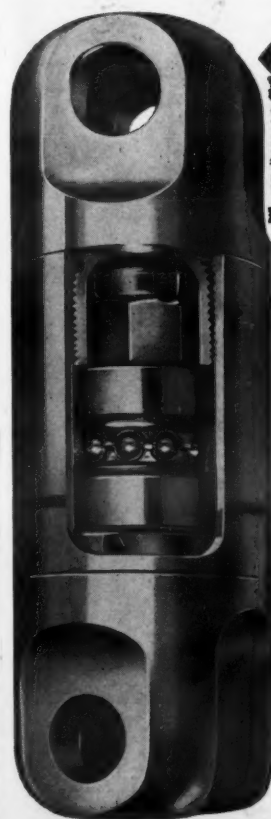
Write for literature and prices.

Also write for information on
The New SMITH
MODEL 70-P COMPRESSOR

SMITH Air Compressors

Gordon Smith & Co. Bowling Green, Ky.

483 College Street



"NEEDED ON ALL WIRE LINES"

For Concrete Buckets, Demolition Balls, Hoisting and Traveling Blocks

Miller SWIVELS

ELIMINATE WIRE LINE TWIST AND KINKING UNDER MAXIMUM LOAD

SAVE TIME—No time lost with spinning loads. No tag lines needed. Operations speeded.

SAVE MONEY—Lines last longer. More efficient use of men and materials.

SAVE LIVES—Operator has greater control of load. Danger of wire lines breaking greatly reduced.

5 to 1 safety factor, Highest strength alloy steel, Tested and Approved, Most efficient angular thrust ball bearing design, sealed against water and dirt. Available nationally, All types and sizes.

WRITE FOR FULL INFORMATION AND PICTURES OF SWIVELS IN USE
GENERAL MACHINE & WELDING WORKS
1100 EAST SECOND ST. • POMONA, CALIFORNIA

dewater the Complete way

THE COMPLETE WELLPOINT IS SELF-JETTING

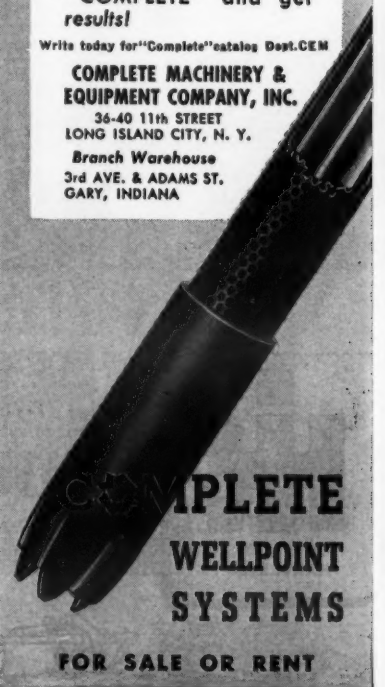
"Complete's" patented wellpoints give you compactness, simplicity, lightness and Strength. Keep wet work bone dry when other methods fail. Write or wire for estimates, and engineering consultation. Don't Gamble with costly water hazards . . . get "COMPLETE" and get results!

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LONG ISLAND CITY, N. Y.

Branch Warehouse
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GARY, INDIANA



FOR SALE OR RENT

6 pick-up trucks, a tractor with a front-end loader, 3 camp trailers, and an equipment trailer. Miscellaneous equipment includes an elevating grader and a pull grader.

The county yard and shop in Hardin has storage and repair facilities for all this equipment, and Hardin is used as central headquarters. There are no other shops. Plans are now under way to build a new shop building 50 x 100 feet on the block owned by the County, which will furnish a very desirable addition. One mechanic is employed at the shop and a custodian is on duty at all times. During the severe winter weather, capable men of the crew recondition and repair all equipment.

When the motor graders are operating at any great distance from the shop, the operator takes a camp trailer and stays on the job. This operator is also furnished a pick-up truck, which carries sufficient gas and fuel for a week's work away from Hardin. All gasoline, fuel, and lubricants are dispensed from the Hardin shop.

The graveling crew also uses camp trailers and tents when they are quite removed from the shop. The men have to put in a full 8 hours on the job, so they find it much more convenient to set up these temporary camps. The cook-house trailer contains everything to prepare good meals. The men pitch their tents, camp out, and take turns at cooking. People pay good money for meals at the Waldorf which any of the camp cooks can equal.

At the present time there is no revolving fund for the replacement of equipment, and new machines have to be chiseled here and there as the money comes in.

Gravel and earth roads are graded at least three times during the spring months to shape them properly, and to tie down with fines the large-size particles in the gravel. This work then lasts usually through the summer with little additional maintenance. By September 1 the roads are ready for a fall clean-up before the snow begins. They are then re-graded and shaped, the weeds are mowed, and culverts cleaned.

Graveling has been a considerable problem in Big Horn County, owing to a peculiar geological condition which left no road material. There are plenty of deposits of sand, and much solid rock, but no gravel pits where the predominating size is suitable for highway construction. Therefore the crusher sees a lot of service each winter, making fine rock for the highway network.

Bridges Getting Old

The major number of bridges were built of timber. At the present time it is necessary to make many complete replacements and extensive repairs. Wherever possible, small structures are replaced with metal culverts. Small stock piles of lumber are stored at several points in the county for emergency use, and an ample lumber supply is maintained at the county yard. The bridge crew has its work laid out several days ahead by the foreman, and with few exceptions is at the yard daily.

A great deal of steel was salvaged recently when a high, obsolete truss bridge across the Big Horn River was replaced by a modern structure. This steel supply will be worked into smaller bridges, and used in various places where smaller bridges are required.

Bituminous Construction

Big Horn County is getting into the bituminous road business. Twenty-one miles have now been built, and this type of construction has proved so successful that there is a demand for much more than the budget will permit. Bituminous construction in general is not done until the road has been permanently located, and the gravel base built up to a point where it will support traffic loads in its own right.

The asphalt is usually MC-3. It is hauled and distributed to a windrow of mineral aggregate, and then blade-mixed by one or more of the county machines. Laying and rolling is also done by county equipment.

Maintenance, on which depends bituminous-surface smoothness, is being done by pre-mixing bituminous patch material on a roadside table in the yard, and hauling it out to the job. Maintenance generally consists of half-sole work to add to the thickness of the bituminous mat.

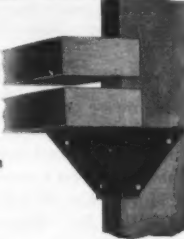
All bituminous roads are maintained to 22-foot width, and lower-type roads are also maintained for a minimum of 22 feet.

New construction jobs, both by Federal Aid and other means, are also being done, and about 33 miles has been added in the past 3 years. Most Federal-Aid jobs are done by contract, while some new county construction is done in summer by the county machines and men. The County is working with an eye toward the eventual widening of

right-of-way and the leveling of slopes to reduce the snow-removal job.

Last winter the worst snow in years came to Big Horn County. Many people were stranded without food. Others were caught with stock in danger. But county equipment worked day and night, and there was no loss of life. One of the most effective pieces of equipment was a one-way plow on the new Austin-Western 99H motor grader.

**For best results in concrete structures—
WRITE FOR CIRCULAR:—
SUGGESTIONS FOR USING WILLIAMS FORM CLAMPS AND THEIR ACCESSORIES.**

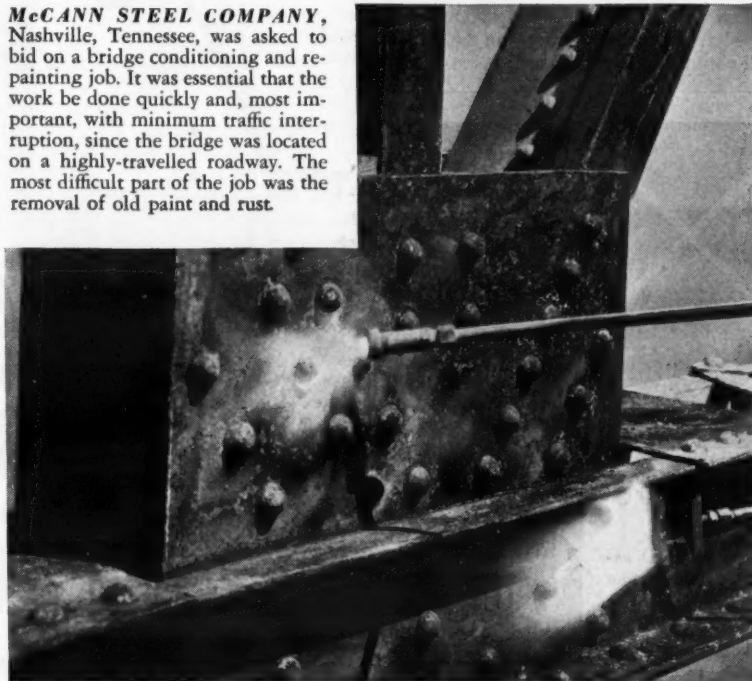


Pointers on:
Vertical spacing of walers
Spacing clamps on walers
Form width spacing
Securing corners
Using double walers
Aligning forms
Clamp assembly
Taking off inner rod quantities

WILLIAMS FORM ENGINEERING CORP.
Madison Ave. & Garden St. Grand Rapids, Mich.

Oxyacetylene Flame Cleaning speeds bridge repainting—without traffic interruption

McCANN STEEL COMPANY, Nashville, Tennessee, was asked to bid on a bridge conditioning and repainting job. It was essential that the work be done quickly and, most important, with minimum traffic interruption, since the bridge was located on a highly-travelled roadway. The most difficult part of the job was the removal of old paint and rust.



F. T. Wilson, Airco technical sales service representative, recommended oxyacetylene flame cleaning to remove scale and old paint prior to repainting. This process, requiring minimum equipment, leaves a warm, clean surface, which is conducive to a long-lasting paint job. Notice in the photograph how the rivet heads are being cleaned with a round tip and the flat surface is being conditioned with a wide flat tip.

The entire bridge was cleaned most satisfactorily, without disrupting traf-

fic too greatly. City officials were very pleased. Bids for reconditioning a second bridge across the Cumberland River will specify the use of flame cleaning.

If you have steel structures exposed to the elements, requiring long-time paint protection, investigate the advantages of Airco oxyacetylene flame cleaning. For technical service or copies of bulletins ADG-1066A, ADG-1067 and ADR-57, describing this process, please write your nearest Airco Office.

news about products

IMPROVED AIRCO NO. 78E MILD STEEL ELECTRODE



No. 78E is an improved high quality E6010 electrode. It has a very smooth spray type arc with little spatter. The deposit solidifies quickly producing very smooth horizontal fillets. It also operates exceedingly well on vertical up, vertical down and overhead welding. The mechanical properties and X-ray characteristics are excellent exceeding the requirements of the E6010 class.

This electrode is used extensively in the welding of fittings on fired or unfired pressure vessels, storage tanks, structural frames, bridges, pipe lines, and all classes of marine work where high ductility and tensile strength are essential.

AIRCO HELIWELDING EQUIPMENT



All high capacity Heliweld holders are water-cooled to provide sufficient cooling for high currents used. There's the Air-Cooled Manual Holder for light, general-purpose work... the Water-Cooled Manual Holder for heavier, general-purpose work... the Machine Holder for semi-automatic installations... the Automatic Head for the fully automatic operations. Also available is a Heliweld "Bumblebee" for AC heliwelding. This machine has all controls for current, gas and water within its housing, PLUS a one unit power supply.

For more information, write your nearest Airco office today for a free copy of Heliwelding Catalog No. 9.

* * *

Air Reduction supplies Oxygen, Acetylene and other industrial gases... Calcium Carbide... and a complete line of gas cutting machines, gas welding apparatus and supplies, plus arc welders, electrodes and accessories. Ask us about anything pertaining to gas welding and cutting, and arc welding... we'll be glad to help you.



AIR REDUCTION

Offices in Principal Cities

TECHNICAL SALES SERVICE—ANOTHER AIRCO PLUS-VALUE FOR CUSTOMERS



A new 1/2-yard Payloader tractor shovel made by The Frank Hough Co.

New Tractor Shovel

A new 1/2-yard Payloader tractor shovel, designed to load, grade, back-fill, spread, and transport bulk materials, has been announced by The Frank G. Hough Co., 822 Sunnyside Ave., Libertyville, Ill. Expressly designed for tractor-shovel work, the Model HE has a full-reversing transmission with 4 forward and 4 reverse speeds. It features ball-bearing steering, hydraulic brakes, and full visibility for the operator. A 91-inch dumping clearance is provided. Dumping and closing of the bucket are done hydraulically as desired.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 5.

Material-Testing Machines

Two new catalogs on testing machines are offered by the Riehle Testing Machines Division, American Machine & Metals, Inc., East Moline, Ill. Catalog RC-2-50 covers hydraulic compression testing machines and other equipment for testing construction materials such as concrete, brick, and tile. Catalog

RU-3-50 describes Riehle's new Model MA universal hydraulic testing machines. Both folders are fully illustrated and include details of construction, specifications, and dimensions.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 83.

New Electric Plant

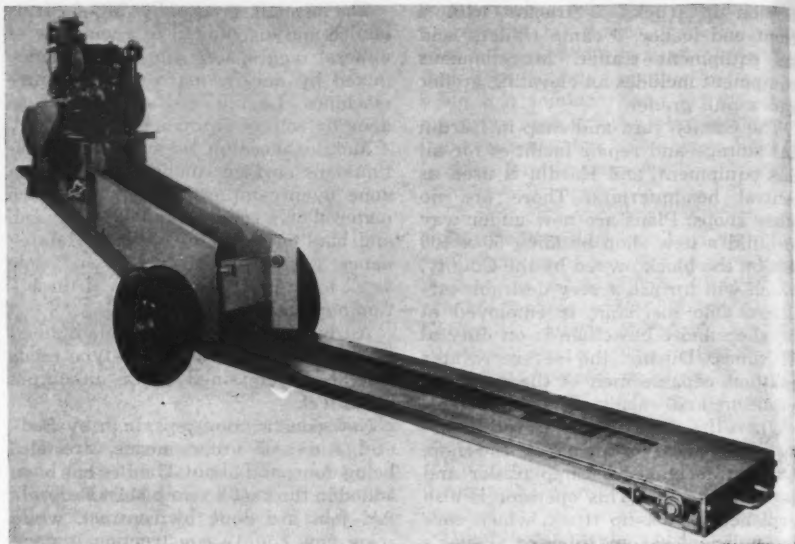
A new small-sized electric power plant has recently been developed by the Kohler Co., of Kohler, Wis. Designed for portable and semi-portable use, the plant provides 750 watts of 115-volt alternating current for lighting and for various power tools with motors not exceeding 1/4 hp.

The automatic model starts when any light, appliance, or motor is turned on and stops when all loads are turned off. The plant is powered by a sturdy, one-cylinder air-cooled engine.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 8.

Hopper-Car Unloader

A new belt-type hopper-car unloader has been designed by Lippmann Engineering Works, 4603 W. Mitchell St., Milwaukee 14, Wis. It may be used to convey stone, sand, gravel, etc. from hopper cars onto waiting trucks. The machine is supplied with either an electric motor or a gasoline engine, and either pneumatic tires or steel wheels. At the forward end of the chute is a gate for adjusting the height of the flow of material up the chute. Along each side of the conveyor a sealed tight rubber strip prevents material from leaking from the belt into the chain or other wearing parts. The



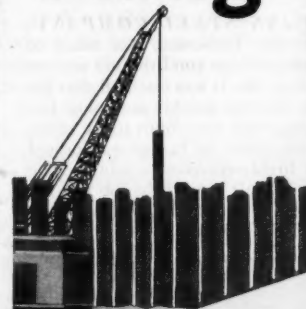
Lippmann makes this new belt-type hopper-car unloader.

unit has anti-friction bearings.

Further information may be secured

from the company. Or use the Request Card at page 16. Circle No. 116.

Need STEEL SHEET Piling?



Rent or Buy it
**FASTER
FROM FOSTER**
ONE TON OR A THOUSAND

The exact length and exact section of piling that the job requires—exactly when you need it, and at minimum cost... that's what you get when Foster services your piling requirements. And Foster Rates on all standard piling sections give you a low fixed expense, providing an added competitive advantage when you bid on jobs. Try us, whatever your needs; you can count on an exacting, prompt service on all sections and makes for ANY job. Remember too—FOSTER GUARANTEES: All material rigidly inspected before shipment. If on your inspection it is not exactly as represented, it is returnable, freight both ways at our expense.

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How You Can Save Clutch Expense

It will pay you to consult ROCKFORD engineers, before deciding on the clutch for your next model. They may be able to help you avoid the tooling and other costs of custom manufacture, by recommending a clutch that fits your need exactly—from the hundreds of different types already in production. You also will benefit from their quarter century of experience in supplying satisfactory clutch performance for hundreds of large volume users. A letter or phone call will bring prompt action.

**ROCKFORD
Power Take-off
CLUTCHES**

ROCKFORD CLUTCH DIVISION
BORG-WARNER
314 Catherine Street, Rockford, Illinois



The Batavia pole-setting derrick for use with Dodge Power Wagons.

Pole-Setting Derrick

A new front-mounted pole-setting derrick, designated Model FT, has been developed by the Batavia Metal Products Corp., 350 Liberty St., Batavia, N. Y., for use with the Dodge Power Wagon. Made of high-grade seamless steel tubing with reinforcement where necessary, this derrick can handle 35-foot poles with a minimum working load of 1,000 to 1,500 pounds.

Also being introduced is the XHM, a new 28-foot extra-heavy derrick for handling 75-foot poles. At present it is being made with one-piece side legs, 26 feet in length, but the design will probably be revised and the derrick furnished with telescoping side legs for ease in handling. Support jacks and mounting brackets are also available for both derricks.

Further information may be obtained from the company, or by using the Request Card at page 16. Circle No. 37.

New Expansion Joint

Keystone Asphalt Products Co., 43 E. Ohio St., Chicago, Ill., has been appointed national distributor for the new Fiberglas expansion joint, manufactured by Owens-Corning Fiberglas Corp. The composition is of an inorganic glass base, offering no sustenance to rot, vermin, rodents, or insects. It is light in weight, absorption is less than one half of that allowed and there is no loss of weight after compression.

The expansion joint will recover over 70 per cent of its original thickness within one hour after stress has been removed; and it has been subjected to extreme freezing and heating tests, demonstrating no disintegration or flow of asphalt, and retaining handling qualities. The use of glass fibers provides a base for the performance characteristics available in this new material.

Further information may be secured from Keystone Asphalt Products Co., or use the Request Card on page 16, Circle No. 19.

Diesels and Diesel Tractors

Two new illustrative booklets, one on diesel engines, the other on the D8 diesel tractor, have been released by the Caterpillar Tractor Co., Peoria 8, Ill. The first, a 16-page catalog, contains complete information on the company's most powerful diesel engines: Models D397, D386, D375, and D364. These power units have maximum ca-

pacities of 500, 400, 335, and 265 hp respectively.

The second, a 32-page booklet entitled "Caterpillar D8 Diesel Tractor," presents full specifications, features, operating characteristics, and applications of this crawler. It also lists special attachments and accessory equipment for the D8.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 47 for the diesel-engine catalog and No. 48 for the D8 diesel-tractor catalog.

Davey Tree Co. Expands

The Davey Tree Expert Co., 152 W. 42nd St., New York City, has expanded its chemical brush and weed-control division. It is now geared to destroy weeds and woody growth in industrial plant areas, and along highway and railroad right-of-ways. This service used to be available only to public utilities for power and telephone right-of-ways.

PUT A MERCURY CLUTCH ON THE JOB



A Mercury Automatic Clutch makes starting easier and prevents stalling on a Cement Floor Finishing Machine.

INSURE LOAD-FREE STARTING AND IDLING

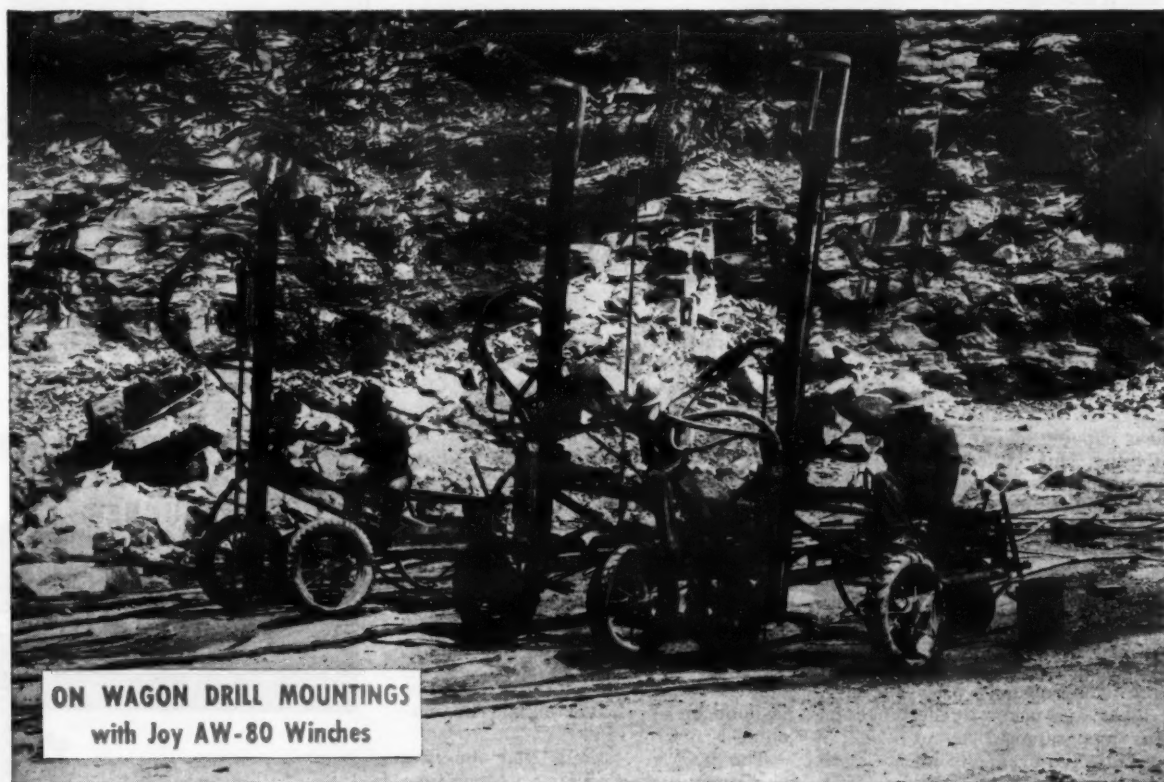
If your construction equipment and machinery is powered by a gasoline engine, insure its trouble-free performance at all times by installing a Mercury Automatic Clutch between the engine and the load. The engine starts easily, picks up the load smoothly, and does not stall when idling or when overloaded.

For all original equipment using gasoline engines... or electric motors... Investigate the advantages of a Mercury Automatic Clutch. Easily installed on jobs in the field, in most cases. Write for Catalog 269-D.

MERCURY CLUTCH DIVISION



AUTOMATIC STEEL PRODUCTS INC. · CANTON 6 · OHIO



ON WAGON DRILL MOUNTINGS with Joy AW-80 Winches

Put JOY SILVER-STREAK DRIFTERS TO WORK ON YOUR JOB—

Watch daily footage **INCREASE** and costs per foot go **DOWN!**



ON QUARRY-BAR MOUNTING

JOY Silver Streak Drifters feature the exclusive Dual Valve with positive cushion control. It gives a harder, more powerful punch—literally makes air do more work. What's more, JOY Drifters last longer—give you more feet of hole with less maintenance. Exclusive cadmium plating, inside and out, inhibits rust, prevents scoring during run-in, and at the same time, adds power by permitting closer piston tolerances. Ask for a trial demonstration on JOY Drifters—the T-300, T-350 or T-400—prove their all-around superiority right on the job!

Write for Bulletin, or

Consult a Joy Engineer

W&D 2818

WODACK "DO-ALL"

THE MOST USEFUL ELECTRIC HAMMER MADE IN COMBINATION WITH AN ELECTRIC DRILL



UNEQUALED AS TIME AND LABOR SAVER

It's an electric hammer for concrete • It's an electric drill for wood and metals. Hammers holes in concrete forms... cleans mortar from old bricks... grooves and roughs concrete... also drills steel and wood.

WODACK ELECTRIC TOOL CORPORATION CHICAGO 44, ILL. 4827 W. MURPHY ST.

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



The Fairchild Camera & Instrument Corp. precision table for plotting or measuring of points on a plane surface in terms of rectangular coordinates.

New Plotting Table For Precise Layouts

A new precision plotting table has been developed by the Fairchild Camera & Instrument Corp., West Coast Division, 53 W. Union Street, Pasadena 1, Calif. It is designed to permit accurate and rapid plotting or measuring of points on a plane surface in terms of rectangular coordinates. Values of these coordinates are registered on Veeder-Root-type counters to the nearest 0.001 inch. Standard units have a 4 x 6-foot working surface and are based on decimal inch measurements; however, other table sizes, as well as metric divisions, can be supplied in special designs.

The coordinate control system embodies X and Y carriages positioned to the nearest inch by notches spaced to an accuracy of better than 0.0002 inch, the company says. The even-inch notches are subdivided by short lead screws which provides only one inch of travel. Thus, Fairchild explains, the table is capable of extremely accurate positioning, since the lead screw will have a negligible accumulated error.

Large-scale movements are made by a disengaging latch, while intermediate adjustments to 0.001 inch are made by two hand cranks of the automatic disengaging type. Points are established by precision stylus or pencils which are designed to fit the cylindrical holder in the transverse carriage.

While the Fairchild precision plotting table was primarily designed for precise topographical layout work, it also fulfills requirements for mechanical layout. Variations of the instrument can also be supplied for mechan-

ical inspection of master templates, match plates, gage plates, and other layout work.

Further information on this plotting table may be secured from the company. Or use the Request Card at page 16. Circle No. 81.

Gasoline and Diesel-Driven Electric Plants Described

An 8-page two-color booklet covering the complete line of Onan gasoline-driven electric plants ranging from 260 to 35,000 watts—in all standard voltages, frequencies, and phases—has recently been prepared by D. W. Onan & Sons, Inc., 43 Royalston Ave., N., Minneapolis, Minn. Direct-current models in standard voltages are described in ranges from 750 to 15,000 watts. Listed also are battery-charging electric plants in 6, 12, and 32 volts, 400 to 2,000 watts. Special accessories for Onan electric plants are itemized; wall-mount automatic controls, fuel tanks and fuel lines, gasoline carburetors, remote stations and wire, and two-wheeled dollies and trailers.

A "Model Guide" points out the difference between ac, dc, and battery-charging models, and tells how to choose the proper type, size, and starting method. Also offered is a 4-page two-color bulletin on the company's diesel-driven electric generating plants. Models range from single-cylinder 2,500-watt air-cooled units to 6-cylinder 60,000-watt water-cooled plants powered by International Harvester diesel engines. Information concerning parallel operation, automatic controls, optional equipment, and choice of models is included in the bulletin.

This literature may be obtained from the company. Or use the Request Card at page 16. Circle No. 99 for Folder A-168 on gas-driven plants and No. 101 for Folder A-192 on diesel-driven electric plants.

A Road-Planing Service

A bulletin describing a road-planing and processing service with the Universal Heater Planer has recently been prepared by the Universal Road Planer Corp., 83 S. High St., Columbus 15, Ohio. This work, the literature explains, is done on a contract basis; The machine is not for sale.

The booklet explains that the machine has worked on almost every type of bituminous pavement surface. It

heats the surface and planes off the high spots while the pavement is hot. A complete description of the road planer is included in the literature along with illustrations of jobs done.

This bulletin may be obtained from the company, or by using the Request Card at page 16. Circle No. 124.

Metal & Thermit Moves

After 35 years at 120 Broadway, in downtown New York, Metal & Thermit Corp. is moving its general offices to the midtown area. As of May 1, the company's address is 100 E. 42nd St., New York 17, N. Y.

*Takes Work and Waste
out of
Placing Concrete*



Mall 3 H.P. Electric Vibrator

Larger masses of concrete with aggregate up to 8 inches in diameter for piers, dams, tunnels, docks and other heavy construction can be placed with speed and economy when a Mall 3 H.P. Electric Vibrator is on the job.

The dust and vapor-proof motor is geared to deliver 10,000 vibration frequencies per minute, and twice its rated power on momentary overloads. Motor swivels full 360 degrees on low-base mounting.

Unit is rugged and dependable. Equipped with tough rubber housings, famous interchangeable Hi-Kik vibrating heads and easy-coupling shafts.

32 Factory-Owned Service Stations from Coast to Coast provide quick, dependable repair service. Over 1000 Mall Tools for a million jobs. A Dealer in any town can supply you. 30 years of manufacturing design experience.

Write Contractors Division for FREE booklet
"Mall Vibrators" and name of nearest dealer.

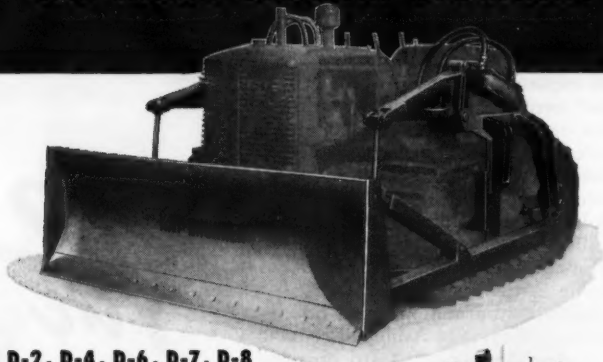
MALL TOOL COMPANY

7743 South Chicago Avenue

Chicago 19, Illinois

KAY-BRUNNER

**Builds Bulldozers
and Trailbuilders
for these Crawler Tractors:**



**CATERPILLAR D-2, D-4, D-6, D-7, D-8
INTERNATIONAL TD-6, TD-9, TD-14, TD-18
ALLIS-CHALMERS HD-5, HD-7, HD-10**

K-B Bulldozers have reversible, replaceable cutting edge and adjustable braces for blade tilting. Entire unit can be completely dismantled for transporting. K-B Trailbuilders can be angled to right or left for side-casting materials. Both units are available with hydraulic or cable control and are furnished with all equipment necessary for mounting on the tractor.

K-B Bulldozers and Trailbuilders have fast blade action, are easily handled, allow maximum working visibility and are built to take a beating. For ditching, sloping, clearing, finishing and general earthmoving, there is a K-B unit for your tractor and your job.

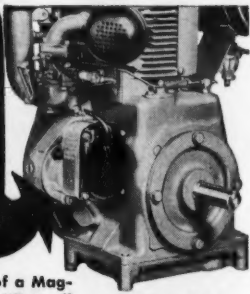
For specifications and prices, send us the make and model number of your tractor, specifying Bulldozer or Trailbuilder, hydraulic or cable control.



**Above—Cable control
mounting on K-B Bull-
dozer. Below—Hydrau-
lic control mounting on
K-B Trailbuilder.**



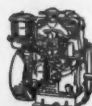
Why **WISCONSIN**
HEAVY-DUTY *Air-Cooled*
**ENGINES Have a Rotary-
Type OUTSIDE MAGNETO**



Perhaps you have never given much thought to the placing of a Magneto on an engine, nor whether it's of the "flywheel" or "Rotary" type. It's an important point because the magneto is really the heart of the engine. When it fails, your power fails.

Wisconsin engineers have found through long experience and experimentation that the best place to put the magneto, not only for convenient accessibility but for better ignition performance over an extended period of time is on the OUTSIDE... with an independent, direct drive from the engine to the Magneto. The Rotary Type high tension magnetos used by Wisconsin Air-Cooled Engines provide the greatest protection against ignition troubles because the Magneto itself is a complete, independent operating unit that doesn't rely on an unrelated part of the engine for its successful operation. It's tightly sealed against dust and moisture, of course, so it isn't affected by wet weather or snow and there is no chance of it getting "fouled up". And it's equipped with an Impulse Coupling that provides a quick, hot spark for easy starting in any weather, in any climate, a feature that can't be incorporated in flywheel-type magneto.

Yes, the MAGNETO is important... both as to type and placing on the engine. It's the right kind and in the right place on Wisconsin Heavy-Duty Air-Cooled Engines. Specify "Wisconsin" for your 3 to 30 hp. power needs... Descriptive literature on request.



WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 14, WISCONSIN



KAY-BRUNNER STEEL PRODUCTS, Inc.
EQUIPMENT DIVISION

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POWER CONTROL UNITS • LAND LEVELERS • DOZERS AND TRAIL BUILDERS • RIPPERS • CARRYING SCRAPPERS • TAMMING ROLLERS • HYDRAULIC CONTROL SYSTEMS

Structural Experts Rebuild Race Track

Short Time Limit Hurries Work To Repair Fire Damage to Main Grandstand of Turf Club

+ FIRE!

On May 5, 1949—hours after contractors had turned over to the owners of Hollywood Turf Club a new addition to the luxurious stands—crackling flames driven by a strong wind swept through the ornate 1,600-foot structure. In almost less time than it takes to tell, the pride of southern-California horse-racing fans was a shambles. Practically everything above the mezzanine floor was destroyed.

With little time left before the next racing begins on June 15, contractors have been racing with the calendar to do a whopping big major repair job, estimated to cost between \$2,000,000 and \$3,000,000. Prime contractor for the major renovation is General Contractor Robert E. McKee of El Paso, a specialist in heavy building construction throughout the southwest. The work, which began on December 6, must be finished and accepted in time to see the start of the 1950 racing season in the style to which Hollywood Park fans are accustomed.

New Building Fireproof

The building, after being finished this time by McKee's men, will be as fireproof as modern architectural ingenuity can make it. The stands are rebuilt to the same general design as the original construction, but instead of a wooden structure all main members, the roof, and floors are of steel.

The heavy upright columns, the structural members which support the roof and seats, the top purlins, the cantilevered structural overhang: all these are being built this time out of steel members. There will be about 1,725 tons of structural steel. Approximately 17 carloads of Robertson and Truscon steel roof and floor deck are to be laid at the various levels, topped with a fire-resistant floor surface which will be safe.

Operations naturally center around the structural-steel erection, which must go in as rapidly as possible in order to get the grandstand finished on time. The furnishing and placing of all the steel structural work is being done under a prime contract by Bethlehem Pacific Steel Co. of Los Angeles.

Oddly enough, the new design will save some steel tonnage. Each heavy front truss, for example, weighs slightly over 4 tons, a saving of a ton of steel from the original construction where a heavier built-up roof was employed.

Assembly-Line Erection

Bethlehem Pacific is employing an assembly-line method of steel erection, calculated to finish the grandstand as the work progresses.

An MC-4 Lorain truck crane, rated at approximately 15 tons, is being used to unload all of the structural steel from trucks which haul it in to Inglewood, where the race track is located. Since the heaviest lift is only a little more than 4 tons, the truck crane is equipped with an 80-foot boom and a special 30-foot jib extension.

Equipped in this way for maximum reach, the Lorain truck crane in addition to unloading the steel also erects the entire west elevation of each bay; then moves around to the opposite side of the building to erect the cantilevered overhang.

The entire center section of the new grandstand is being put up by a Type D guy derrick, working from the mezzanine deck of the grandstand. This is

somewhat dangerous, and the business of moving the derrick along is reported to be the one move which calls for the most caution. The Type D derrick consists of a 100-foot mast and a 90-foot boom. Boom and load lines are controlled by an electric-driven 3-drum American hoist, set well back near the paddock in the center of the grandstand.

Structural erection at the paddock is being handled by another Lorain truck crane, rigged similarly to the one which unloads steel and erects the outside of the building.

Structural erection began at the southwestern end of the grandstand, with the guy derrick and the truck crane working together to complete each 80-foot panel of steel. After the

main uprights are placed, other members follow in turn. The structural-steel framework is all-riveted construction, with the exception of a few minor members such as the seat rests and roof purlins, which are bolted to the main frame members.

When an 80-foot panel is finished, it takes approximately 3 hours to undo the guy wires on the derrick and move it carefully ahead in 5-foot moves. The

derrick rests on the mezzanine floor on four 12 x 12-inch steel H-beam skids, and the mast is of course mounted on a center pintle. All signals between the rigger foreman and the hoisting engineer are communicated through a telephone, with a loudspeaker in the hoisting engineer's shack.

The McKee organization established a carpenter shop with power saws early (Concluded on next page)



LANSING F4-1/2 WHEELBARROW

The most popular wheelbarrow on the market for handling wet concrete. Ask your dealer or write direct to Lansing or one of our warehouses.

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Let your records tell you!



It's no news that the true cost of wire rope cannot be reckoned by purchase price alone. As we've so often pointed out, the real cost is the cost per unit of work it does.

In the case of Bethlehem rope, this figure will be *low*, and you will therefore have an economical rope. But we strongly suggest that *you* prove this to your own satisfaction. Keep some simple records; something to show, for instance, the rope costs per

ton-mile in oil-country drilling . . . or per car of coal hauled up a slope . . . or per cubic yard of rock moved, etc. Pick the most convenient unit of work

applicable to your business. It isn't at all difficult or complicated.

Then, study your records every so often. They'll tell you, far more convincingly than we can, that Bethlehem wire rope is an *economical* rope.



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Bethlehem Pacific Coast Steel Corporation
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Structural Experts Rebuild Race Track

(Continued from preceding page)

in the job, to finish that portion which calls for carpentry. As soon as the structural steel is all in place, other specialty contractors will put in an appearance to perform such work as plumbing, installation of electrical fixtures, and so on.

All architectural design work is under the supervision of the firm of Arthur Froelich of Beverly Hills, represented in the field by A. F. Nichols.

Bert Kunkle is Field Superintendent for Robert E. McKee, assisted by Carpenter Foremen Robert L. Lee and W. M. Dvorak, and by H. J. Murphy, Purchasing Agent, whose difficult job it is to arrange for the orderly arrival of needed materials.

Structural-steel work by Bethlehem is under the field supervision of Hy Carpenter and F. C. Woodward, the latter taking over when Carpenter became ill.

A New Diesel Engine In 195 to 375-Hp Range

A new small-sized and heavy-duty diesel engine in the 195 to 375-hp range has been announced by the Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. The TS diesel is a 4-cycle single-acting engine, with a 7-inch bore, 8½-inch stroke, a weight of about 30 pounds per horsepower, and a fuel consumption of 0.40 pound per horsepower-hour, according to the manufacturer.

Cylinders are provided with replaceable wet-type liners and individual heads with overhead valves and intake and exhaust valve-seat inserts. The thick-wall long-skirt pistons are of aluminum alloy, with ventilated oil-scraper rings above and below the full-floating piston pins.

Both the main and crank-pin bearings have aluminum-alloy full-floating interchangeable shells. The camshaft, blower, water pump, and lubricating-oil pump are all gear-driven from the fly-wheel end of the machine, permitting power take-off from either end. Individual fuel-injection pumps serve each cylinder, with two single-hole non-clogging nozzles per cylinder. The engine is full-pressure-lubricated throughout, and has a gear-driven mechanical supercharger which supplies air for increasing initial pressure in the cylinders and for scavenging during the latter part of the exhaust stroke.

Normal starting is by 250-psi air admitted to all cylinders in turn through a starting-air distributor. Other methods of starting can also be furnished. The TS diesel mounts on a simple concrete base, or on welded-steel skids where portability is desired.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 75.

Portable Grease Gun

A new portable electric grease gun, 23 inches high x 27½ inches long, has recently been developed by the Brown Grease Gun Co., Charlotte, N. C. Mounted on rubber tires and weighing about 230 pounds loaded, the unit has a capacity of 25 pounds of grease. A modified 5-hp Ford starter motor is designed to provide sufficient pressure for the flow of grease of any viscosity. A thumb screw adjusts the maximum nozzle pressure from 500 to 12,000 psi.

The metering hand nozzle can be adjusted to pass a tiny drop or a large shot of grease. A rectifier and drop cord for recharging the gun battery is built into the nose of the gun. The machine is completely portable and requires no trailing wires or hose. A built-in charger is designed to bring a completely discharged battery to a full



The Brown portable electric grease gun weighs about 230 pounds loaded and is 23 x 27½ inches in size. It has a capacity of 25 pounds of grease and will grease about 5,000 fittings before its battery must be recharged.

charge in 12 hours. The charging current automatically drops as the battery builds up, and no damage occurs if the charger is left running after the battery

is fully charged, the company says. The 6-volt power eliminates the possibility of injury to the operator.

When handling the heaviest or most

fibrous greases, the gravity-feed tank may be converted to a pressure feed to insure grease flow at low temperature, the manufacturer states. All moving parts of the unit operate in an oil bath. It is said that the gun will grease about 5,000 average fittings before the battery must be recharged.

Further information may be secured from the company. Or by using the Request Card at page 16. Circle No. 82.

Arcos Appoints Three

The Arcos Corp., Philadelphia, Pa., maker of stainless low-alloy high-tensile and non-ferrous electrodes, has appointed Bernard E. David Special Field Engineer in Los Angeles and Walter Gordon List as Special Field Engineer in the Ohio and western Pennsylvania territory. Mr. List will work with Williams & Co., Inc., of Pittsburgh, in the sale of Arcos electrodes. J. J. Schlass has been named a sales representative in the Philadelphia district.



KOEHRING 2½-yard 1005 has plenty of power, stamina and weight-stability to hold solidly when digging into the toughest rock banks. It's specially-engineered for heaviest 2½-yard service.

Every operating assembly, from the 1005's cast-alloy crawler shoes to boom point, is extra-heavy-duty to meet the typical strains of 2½-yard digging. Crawler frames and axles are separate units from the carbody . . . provide "give" in the excavator base. Crawlers are easily moved in for shipping clearance. Positive traction-brake steering provides exceptional maneuverability. Center pivot bearings protect vertical traction shaft from horizontal stresses . . . husky hook rollers resist vertical stresses. Compact upper machinery, on one-piece turntable, is simple, accessible.



Big 37", double-band swing clutches are self-equalizing. Clutch housings

constantly rotate, dissipate heat, give smooth, cool operation. Entire machine is 100% mechanical . . . no complicated hydraulic or air systems requiring service specialists. Adjustments are easily made by operator.

Operators also like the way the 1005's big, 48" power clutch retains "feel" of load . . . with only 1/10th the normal lever pull. Another Koehring feature, instantaneous dipper trip, works every time . . . saves spillage . . . speeds loading for top yardage output.

This heavy-duty Koehring 1005 is diesel powered, can also be furnished with electric motor. Quickly converts from shovel to dragline, clamshell or lift crane. Safely lifts up to 79½ tons . . . boom sections up to 120', plus 30' jib. Other Koehring excavator sizes: ½-yd. 205, ¾-yd. 304, 1½-yd. 605.

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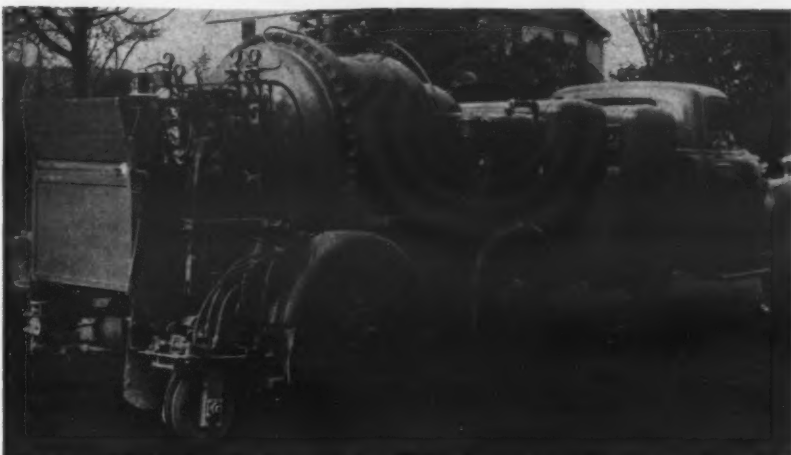
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Connecticut Has New Center-Line Marker

Complying with standards of the American Association of State Highway Officials, Connecticut plans to apply reflectorized paint to all center-line markings on its state highway system. The department machine shop has developed and built a new pavement-marking machine to do the work and has altered an older machine to help out.

The new machine is mounted on a truck chassis fitted with a trailing third axle. Its major units are two 60-cubic-foot air compressors, and a 350-gallon mixing and working tank built to ASME code for a working pressure of 100 pounds. This tank has a built-in agitator which keeps the reflectorizing beads in the paint in suspension. Two sound-powered weatherproof head-set transmitter telephones furnish communication between the driver of the truck in the cab and the spray-gun operator who works from a seat in the rear. A



The Connecticut Highway Department's new traffic-line painting machine will spray reflectorized paint in two continuous lines, one broken and one solid line, a single solid or a single broken line, while moving along at 12 mph.

special power-driven pump transfers paint from the supply containers to the mixing tank. Cams, valves, gages, strainers, paint and air lines, levers,

warning lights, and a siren complete the unit.

The machine can spray two continuous lines, one broken line and one solid

line, a single solid or a single broken line, while moving at 12 miles an hour. The broken lines are 4 inches wide and 15 feet long. The longitudinal gaps between the lines have been reduced from 35 to 25 feet to increase the visibility of the center line in bad weather. Application of paint to the roadway surface is controlled from the rear seat by electrical impulse.

The size of the job ahead of this machine can be gaged by the fact that Connecticut has bought 135,000 pounds of reflectorizing beads.

New Wet-or-Dry Pump Protects Masonry Saw

The new factory-sealed water pump on the Model HD Clipper masonry saw makes it unnecessary to disconnect the pump when cutting dry, according to the Clipper Mfg. Co., 2803 Warwick, Kansas City 8, Mo.

To switch from wet to dry cutting, the operator turns the pet cock on the outlet of the pump. This pump cannot be damaged by dry cutting, nor is there need to remove the V-belt, Clipper says. The new pump is designed to eliminate the danger of forgetting to disconnect the V-belt, letting the water in the reservoir run low, or clogging the water suction line.

The new 1950 Model HD is the only one of the nine Clipper models featuring the factory-sealed pump. This model handles all ranges of masonry materials from 1-inch quarry tile to 12-inch concrete block.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 112.

Belt Conveyor Selection Outlined in New Booklet

A new 52-page handbook providing a detailed outline for the selection of Pioneer Continuflo conveyors has recently been prepared by the Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn. The new booklet describes two plans for ordering conveyors: Plan 1 covering pre-engineered conveyors and Plan 2 covering job-engineered types. Complete with tables to simplify conveyor selection, the booklet tells how wide and how long the belt should be, its correct angle of incline, the spacing of idlers, motor horsepower required, and all other data necessary for the selection and specification of the conveyor required to meet a particular need.

The pre-engineered conveyor offered by Pioneer is a complete package ready to install and operate, and is available in 18, 24, 30, and 36-inch widths, in lengths from 30 to 120 feet. Job-engineered conveyors, available in the same belt widths, are recommended by the company for horizontal conveyors, or for lengths below 30 or over 120 feet. The handbook is fully illustrated with photographs and drawings, indicating construction features of the equipment and on-the-job applications.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 30.

A-C Executive Dies

M. J. Proud, Manager of the Tractor-Division, Export Department, Allis-Chalmers Mfg. Co., Milwaukee, Wis., died of a heart attack, April 16, in San Jose, Costa Rica.

Mr. Proud joined Allis-Chalmers in 1935 and was assigned to the branch at LaPorte, Ind. In 1936 he became Agricultural Sales Manager of the Memphis branch and in 1944 he was appointed Peoria Branch Manager. He came to Milwaukee in 1945 as Northwest Territory Manager and held this position until 1948 when he was made Manager of the Tractor Division's Export Department.

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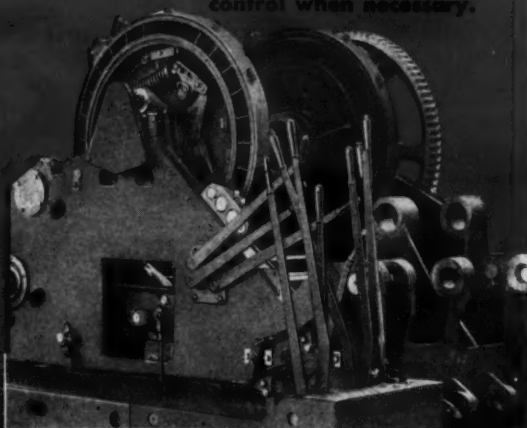
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ALLIS-CHALMERS FOR YOUR HEAVY-DUTY EXCAVATING ... have same rugged, big-production ability as Kuching excavators (1½-yd. 603 Illustrated). Combined, they give you matched excavating-handling efficiency. Dipper has 3-yard rock body ... ton of strength for every ton of payload capacity ... 2-speed travel, both forward and reverse ... constant mesh transmission ... and 2-speed motor drive.



At the Pope railroad siding, a Bucyrus-Erie 54-B crane with an Owen 3-yard clamshell loads a Mack truck with riprap for Enid Dam.



On the upstream slope of the dam, the riprap goes in on a 12-inch gravel blanket. A Bucyrus-Erie 38-B crane handles the rock skip.

Earth Dam to Check Yazoo Valley Floods

Rolled-Fill Embankment at Enid, Miss., Will Take About 7,500,000 Yards of Excavation; Concrete Spillway

AS part of the comprehensive flood-control plan of the Yazoo River Basin, the Department of the Army, Corps of Engineers, is constructing a rolled-fill earth dam, about 3 miles northeast of Enid, Miss., which will require approximately 7,500,000 cubic yards of excavation. The dam site is located on the Yocona River in Yalobusha County just east of U. S. 51. The Yocona lies in the basin of the Yazoo River which empties into the Mississippi River above Vicksburg.

The master plan for the Yazoo Basin includes four major dams and reservoirs in Mississippi, two of which—Sardis and Arkabutla—were constructed within the past decade. The

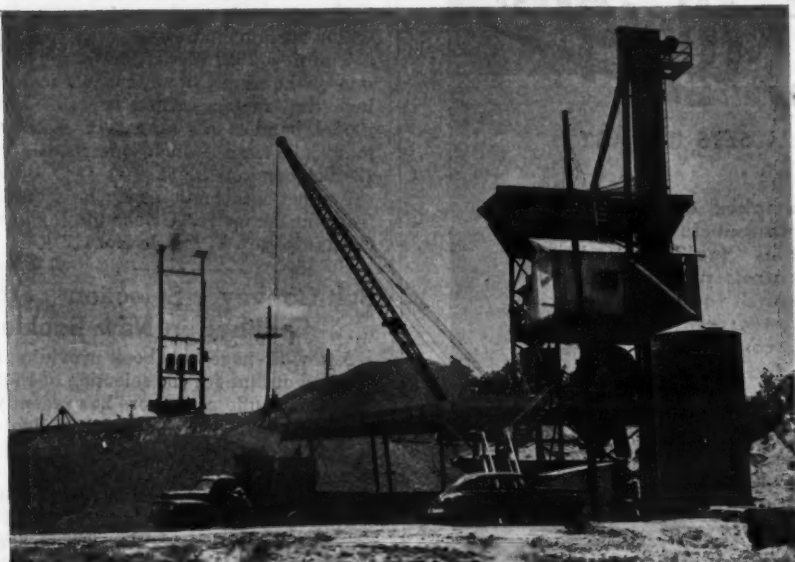
other two, both of which are still under construction, are Enid and Grenada. The two completed reservoirs lie north of Enid, while Grenada is to the south.

The object of the plan is the protection from overflow of the basin above the head of the Mississippi River backwater area. The land lying along the east or left bank of the Mississippi between Memphis and Vicksburg, under this protection, is the well known Mississippi delta, embracing over its rich black soil some of the finest cotton-growing acreage in the world.

Work on the Enid Reservoir Project, the subject of this article, got under way in February, 1947, and is scheduled for completion in 1952. The total cost, including lands, utility and highway relocations, and operating facilities, will be approximately \$14,000,000. A contract for the construction of the major portion of the embankment and a reinforced-concrete spillway at the

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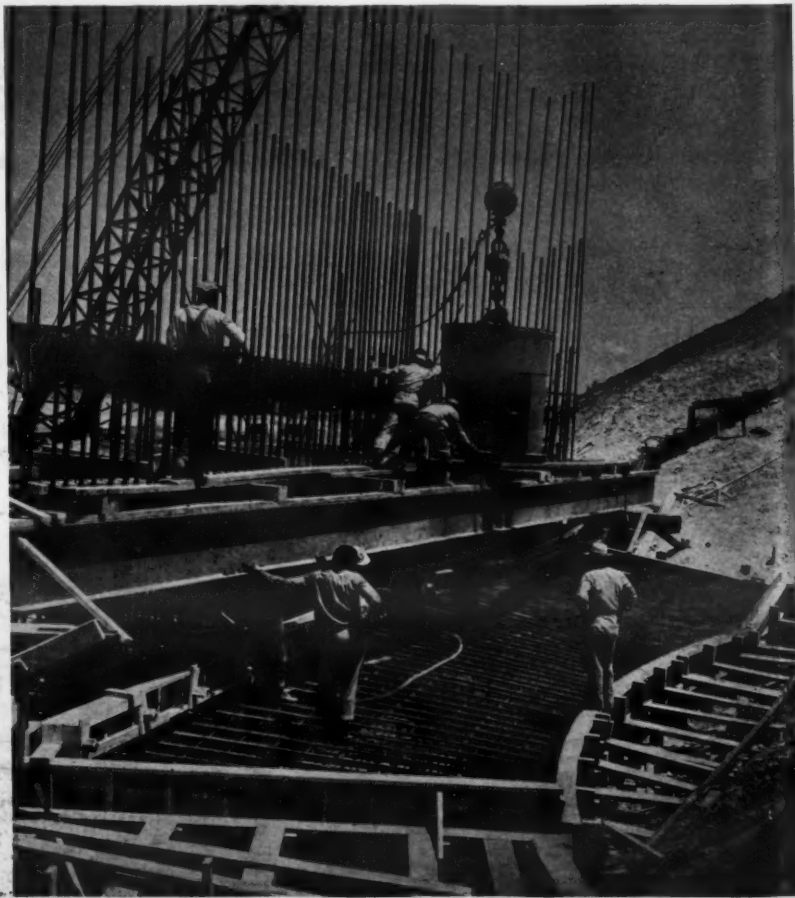
C. & E. M. Photos



The batch plant for the spillway concrete—Johnson throughout. A batch truck pulls out from under the Koehring mixer. A Lima crane charges the aggregate bin.



A footing is poured for the upstream wing wall on the south side of the spillway. A Koehring crane picks a concrete bucket off a truck and swings it to the forms.



A pour in close-up, as a Blaw-Knox 2-yard concrete bucket discharges into a footing form. The concrete was placed in 18-inch lifts—largest pours around 400 yards.

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north end was awarded by the Corps of Engineers, Vicksburg District, to T. L. James & Co., Inc., and Williams Bros. of Ruston, La., at an estimated cost of \$5,427,000. This part of the project will be finished in 1950.

Enid Dam

Enid Dam is 8,400 feet long with an average base width of 410 feet and an average height of 85 feet above the floor of the valley. Its 30-foot-wide crest is at elevation 293.0 MSL. The axis of the dam is on a north-south line, with the north abutment located on slightly hilly ground from which the flood plain of the river stretches away to the south. The Yocona now flows down the center of the valley through a gap that has been left in the structure. Another contract includes the closing of this gap and the construction of an outlet structure in the north abutment, thus providing a means of regulating the outflow of impounded water. Bids were opened on February 21, 1950; low bidder was Cook Construction Co. of Jackson, Miss., with an estimated cost of \$2,470,000.

The outlet structure will consist of twin 11-foot-diameter concrete conduits, each controlled by an 8 x 16-foot gate regulated from an operating house on top of the structure. Invert elevation of the conduits is 205.5, with a regulated conduit outflow of 2,400 cfs, and a design conduit capacity of 9,400 cfs. The flow at the discharge end will be into an 84-foot long stilling basin.

The spillway now under construction is north of the outlet works, located in the north abutment. It is the chute type, 200 feet wide, with a crest elevation of 268.0, and protects the dam from overtopping by lake waters in the event that the flood of record is exceeded. It is designed to discharge 49,700 cfs at the maximum surcharge pool elevation of 284.0.

The reservoir has a drainage area of 560 square miles, and will have a total storage capacity of 602,400 acre-feet at elevation 268.0, the spillway crest level. The lake thus formed at this level will have an area of 28,000 acres. A conservation pool will be maintained always at elevation 230.0, with a surface area of 6,100 acres and a storage capacity of 57,600 acre-feet.

Pervious and Impervious Material

A cross section of the dam shows a core of impervious material 10 feet wide at the top with side slopes of 2½ vertical to 1 horizontal. From this impervious core the material within the dam graduates gradually through random fill having a 1 on 1 slope upstream and a slope of 1 on 1¼ downstream to relatively pervious material in the outer parts of the embankment. On the downstream side the outer slope is 1 vertical to 2½ horizontal, but this side also has two 10-foot-wide berms at elevations 267.0 and 240.0. The downstream slope is covered with loam and sodded.

On the upstream side the slope is 1 vertical to 2½ horizontal from the



C. & E. M. Photo

A Bucyrus-Erie 54-B dragline with a Hendrix 4-yard bucket excavates for the spillway chute and stilling basin of Enid Dam.

crest down to elevation 267.0 where it flattens out slightly to 1 on 3. This face is protected by a 30-inch blanket of

dumped riprap on top of a 12-inch course of graded gravel. Under the base of the dam from toe to toe of

slopes is a 5-foot layer of pervious material, except for an 85-foot impervious (Continued on next page)

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machine to another and frees the crane for other work. Your MultiFoote on wall pouring will eliminate false work and save time and money.

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Earth Dam to Check Yazoo Valley Floods

(Continued from preceding page)

core section. All the pervious material used in the dam was first washed in a processing plant before being placed.

Embankment material came from the spillway excavation which was started in August, 1947, or from three borrow pits located off the southeast, southwest, and northwest corners of the dam structure. The average haul from all three pits was about 1 mile. A 200-foot-span construction bridge of timber trestle was built across the river, downstream of the dam, for hauling equipment to use in getting from one side of the job to the other. The flood of February, 1948, washed it out, but it was replaced.

The material that went into the dam ranged from a clay silt for the impervious core, through mixed dirt in the random fill, to a sand, gravel, or silty sand for the relatively pervious requirements. When material unsuitable for the embankment was excavated from the spillway cut, it was wasted in two areas made available above and below the dam site for that purpose.

To insure the safety of the dam against underseepage, an underground drainage system was installed along the downstream toe of the embankment. The feature of this drainage was 91 relief wells extending down into the previous strata beneath the dam. Drainage from these wells flows through a 48-inch corrugated-metal collector pipe into the river below the dam, either directly or through the diversion ditch that was dug to take the flow from the outlet structure.

Dirt Work

At the start of operations the contractors cleared and stripped the site in preparation for building up the long embankment. Little dirt was moved through the rainy winter months from December to April during the course of the job, but when the weather was favorable the pace was stepped up to three shifts a day. During the early stages of construction the work area was protected by earth cofferdams, both upstream and downstream, running from the river back to higher ground. Surface water was pumped out of the inside by one 6-inch and a couple of Carver 4-inch electric pumps; they were also used later to keep the spillway hole free of water. One 6-inch gasoline stand-by pump was also used.

Electric current was supplied to the project by the Tallahatchie Valley Electric Power Association. Also on the job were 4 Caterpillar D3400 15-kw diesel-electric light plants with 30-foot steel towers, each holding eight 1,000-watt lamps.

Excavation was handled by two Bucyrus-Erie 54-B draglines with 50-foot booms and Hendrix 4-yard buckets; a Koehring dragline with a 50-foot boom and a 2½-yard bucket; two Bucyrus-Erie 38-B draglines with 2½-yard buckets; two Lorain 1½-yard shovels; and a P & H ¾-yard dragline. Hauling equipment included fifteen 13-yard bottom-dump Euclids; four 8-yard Caterpillar DW10 wagons; and assorted dump trucks. Also on the job for testing was an 18-yard bottom-dump Euclid, with a heaped capacity of 22 yards. This unit is twin-powered, having a 190-hp diesel engine driving the tractor's rear wheels, and a similar engine in the rear driving the trailer wheels.

A new LeTourneau earth-mover, the Tournahopper, was also given a tryout. This bottom-dump hauling unit carried loads up to 26 yards in its 10 x 10 body. A recent Heilinger bottom-dump hauling unit was also experimentally tested.

Placing the Fill

The embankment fill was spread in

6-inch lifts and compacted with eight passes of the sheepfoot rollers. On the job were 10 Caterpillar D8 and D7 tractor-dozers which did the leveling or pulled the 3 Tampo rollers—1 double-drum and 2 triple-drum units. The optimum water content was carefully observed to get maximum density. River water pumped to a standpipe filled 4,000 and 5,000-gallon tanks mounted on Athey wagons which were pulled over the dam by tractors. A smaller 1,500-gallon tank on a GMC truck laid the dust on the haul roads. A couple of Caterpillar No. 12 motor graders kept these haul roads in shape, and also final-dressed the fill.

Riprap on the upstream face was placed in several stages, the first being done from the bottom of the slope, and thereafter from the crest of the embankment as it was built up. Kochtitsky & Johnson Co. of Oakland, Miss., which supplied the sand and gravel aggregate for the concrete operations, also furnished and placed the gravel blanket on which the riprap was placed. The 12-inch gravel layer was placed by 4-cubic yard dump trucks which were lowered down the slope by cable, and dumped the material directly in place. A P & H 206 dragline then pulled a drag and a harrow along the slopes, distributing the material evenly, and

working the larger pieces up to the surface.

Riprap was supplied by the Franklin Limestone Co. from its quarries at Nashville and Columbia, Tenn., and was delivered by rail to an Illinois Central Railroad siding constructed for this purpose near Pope, Miss., about 6 miles from the dam site. There it was unloaded from the gondola cars by a Bucyrus-Erie 54-B crane, using an Owen 3-yard clamshell bucket, to a fleet of 8 trucks which hauled the material to the job. Upon reaching the upstream slope the trucks end-dumped into a 6-yard rock skip handled by an

(Continued on next page)



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Engineered Completely New from the Ground Up with Big Tractor Design, Balance and Strength

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11,250 lbs.—60" tread

Speeds:

5 forward, to 1.5 mph
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Horsepower:

40.26 drawbar

Engine:

General Motors Diesel

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NOT TIED DOWN TO SPECIALIZED DUTY—YET GIVES SPECIAL PERFORMANCE

Osgood crane. The riprap stone was dumped on the gravel and graded off in such a manner that uniform distribution of the larger stones was insured and the smaller fragments and spalls filled the spaces between the larger ones. This work was done by the crane, assisted by hand labor.

Concrete Batch Plant

For the spillway work, a concrete batch plant was set up at the north end of the dam within a short haul of the site of the structure. The C. S. Johnson plant consisted of a 4-compartment aggregate bin and a 500-barrel cement silo fed by a worm gear and enclosed

elevator. Sand and gravel were delivered to the plant by truck from two pits about 15 miles away. Two sizes of gravel were used for coarse aggregate— $\frac{3}{4}$ to 1½-inch, and $\frac{3}{4}$ to $\frac{1}{4}$ -inch—as well as two sizes of sand.

Bulk cement from both the Alpha Portland Cement and Lone Star Cement Cos. at Birmingham, Ala., was delivered to the Pope siding and transferred to a Johnson 500-barrel silo. An enclosed truck hauled the cement from there to the silo at the plant. Darex was added to the batches to give the concrete an air content averaging 4½ per cent. Water for the mix was pumped from a 280-foot well by a 210-gpm

electric pump into an 18,000-gallon tank at the plant.

Concrete was mixed for 2 minutes per batch in a Koehring heavy-duty concentric zone mixer set up in the plant on a level below the aggregate bin. The bins were charged by a Lima crane having a 45-foot boom and a 1-yard clamshell bucket. The plant was so laid out that 2 trucks, carrying the concrete in Blaw Knox 2-yard buckets, made a complete loop under the tower to get loaded. Each truck held 2 buckets on its flat-bed body.

Concrete Spillway

Excavation for the spillway got under

way in August, 1947, and the first concrete pour was made in May, 1949; the spillway was completed early in 1950. Forms were built of 1½-inch sheathing, with the exposed surfaces lined with U. S. Rubber Co. Hydron absorptive material. The forms were backed with 3 x 6 studs on 16-inch centers and double 3 x 6 wales on an average 3-foot spacing, with Richmond ties holding the panels together. The structure is symmetrical about the center line, but a wide variety of form work was necessary. Reinforcing steel was furnished by the Truscon Steel Co. of Gadsden, Ala. The rods for each monolith were un-

(Concluded on next page)



Hydraulic Bulldozers and Gradebuilders (track or engine-mounted models).
Root Ripper (interchangeable with bulldozer or gradebuilder moldboards).
Hydraulic "V" Snowplows with Wings.



Hydraulic Bulldozers and Dozercasters.
2-Wheel Hydraulic Scrapers. Hydraulic system optional.
Scraper can be hooked in with bulldozer or Tracto-Shovel hydraulic system.

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Winches for construction, logging, oil fields, other operations.
Log Carts.
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TRACTO-SHOVEL... with interchangeable attachments for handling a wide variety of jobs—dirt, material and rock-handling buckets, bucket teeth, bulldozer and angledozer blades, lift fork, crane hook, trench hoe, V-type snowplow, drag bucket, tine fork and rock fork.



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TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

For Greater Production...
For Easier Operation...
For Simplified Servicing

Earth Dam to Check Yazoo Valley Floods

(Continued from preceding page)

loaded, sorted, and stored away as they were delivered to the job site.

Besides the spillway walls, chute, stilling basin, and weir, the slopes on each side of the spillway approach channel are paved with concrete averaging 1 1/4 feet thick. The approach-channel floor is paved for 200 feet above the weir; beneath and above that is a rolled-fill impervious blanket extending to a point 1,000 feet above the center line of the dam. Upstream and downstream steel-sheet-pile cut-off walls were driven.

As the trucks delivered the concrete to the spillway, a Koehring crane with a 50-foot boom or a Northwest crane with a 92-foot boom picked up the buckets and swung them over the forms. A pair of 18-inch steel I-beams laid out over the top of the forms served to support both the reinforcing steel and the wooden forms. The beams rested on framing built beyond the form lines. The concrete was placed in 18-inch lifts and vibrated by Jackson and Chicago Pneumatic air vibrators. The largest pours were around 580 yards. Concrete was cured with water for 24 hours, after which Hunt Process membrane curing compound was used. On flat surfaces, the membrane curing was used exclusively.

Steel sheet piling for the spillway cut-off wall came from the Carnegie-Illinois Steel Co. at Pittsburgh, Pa. Pidgeon-Thomas Iron Co. of Memphis, Tenn., furnished the miscellaneous metal, while the Virginia Bridge Co. of Roanoke, Va., supplied the structural steel for the spillway bridge.

Quantities and Personnel

The major items in the principal embankment and spillway contract included the following:

Embankment, compacted fill	4,215,000 cu. yds.
Dumped riprap	112,000 cu. yds.
Corrugated-metal collector pipe, 48-in.	6,100 lin. ft.
Relief wells	91
Excavation, spillway	2,225,000 cu. yds.
Concrete	28,000 cu. yds.
Reinforcing steel	2,000,000 lbs.
Steel sheet piling	26,000 sq. ft.
Structural steel	235,000 lbs.
Washed pervious borrow	475,000 cu. yds.

An average force of 200 men was employed on the contract by T. L. James & Co., Inc., and Guillems Bros. D. I. Guillems and R. B. Guillems supervised the dirt work of the dam,

while J. E. Walters was Superintendent on the spillway construction.

For the Department of the Army, Corps of Engineers, H. L. Mullin is Resident Engineer, and R. L. Payne, Jr., is Assistant Resident Engineer. The Vicksburg District is headed by Col. Benjamin C. Fowlkes, Jr., District Engineer, and Lt. Col. G. F. Dixon, Jr., is Executive Officer.

New Diesel-Powered Electric Generators

Production of a standard commercial line of diesel-powered electric generators is announced by Cummins Engine Co., Inc., of Columbus, Ind. The 60-cycle units are available in a range of 40 to 250 kw. Similar units are also available for 50-cycle operation at slightly lower capacities. All are designed for continuous service where they are the primary source of power, but their instant starting and high availability also make them useful as stand-by or emergency power sources, the company says.

Optional equipment for them offered by Cummins includes automatic overspeed shutdown control; automatic shutdown for high temperature and low lubricating oil pressure; complete marine-type or radiator-type cooling systems; hydraulic governor; water-cooled exhaust manifold; and a generator-mounted package control unit. Special generator voltages and kilowatt ratings are also available.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 35.

Worthington Men Move Up

Walther H. Feldmann, who used to be President of Electric Machinery Mfg. Co., a Minneapolis subsidiary of Worthington Pump & Machinery Corp., is now Worthington Vice President in Charge of Sales. John J. Summersby is Vice President in Charge of Purchases. And Carleton Reynell is General Representative for the Sales and Purchasing Departments.

Richard H. Olson is now President of Electric Machinery Mfg. Co.

Euclid in Britain

The Euclid Road Machinery Co., Cleveland, Ohio, is establishing a subsidiary, Euclid (Great Britain) Ltd.

Manufacturing facilities in Glasgow, Scotland, are being leased from the British Government and operations will begin soon. Initial production will concentrate on the 15-ton rear-dump hauler, but other models will be built later. H. T. Monson, in charge of industrial engineering and factory manage-

ment at the Cleveland plant, will be Managing Director.

John Blackwood Hodge & Co., Ltd., of Northampton and London will be exclusive sales representative for Euclid (Great Britain) Ltd. in the United Kingdom and most of the sterling countries.

MORE WORK PER MAN PER DAY
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**SANITARY
CONVENIENCE**



New PARCO INSULATED WATER CARRIER and Cup Dispenser

Many sanitary features are built into this outstanding cool water dispenser, constructed with stainless steel interior.

Greater labor efficiency is yours by placing this dispenser at a convenient location, or the unit can be carried to men on the job. For additional information and prices, write today.

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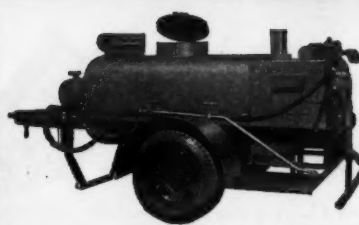
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UTILITY SPRAY TANKS



takes the place
of three units

FOR A UTILITY UNIT to do Road Maintenance work the Littleford No. 101 was designed to do just that. Here's an outfit that can do the work of three units—it has a spray bar for doing small application jobs, a hand spray attachment for doing patch work and a pouring pot outlet for doing patch work or crack filling. This 101 Unit has a fast heating system including U type heat flues with Littleford Vaporizing Torch Burners. The No. 101 will handle Asphalt, Tar, Emulsion, Road Oils or Cutback. Made in sizes to fit any road maintenance job. For further details see your nearest Littleford distributor.

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Speeds up the materials handling part of building jobs... eliminates aching backs. Most practical and widely used contractors' hoist. Weighs only 315 lbs.—easy to roll and load. Simple, safe to operate. Built for continuous use.

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The new Loadlimit models made by T. L. Smith Co. are designed to carry full payload and still meet most state requirements on load limitations.

New Mixers Designed To Meet Load Limits

New Loadlimit truck-mixer models have been announced by the T. L. Smith Co., 2835 N. 32 St., Milwaukee, Wis. They are said to haul full rated truck-mixer payloads and still meet the highway load limitations established by most states. Reduced weight is accomplished through the elimination of parts and assemblies which are not basic or necessary to mixer operation, the manufacturer states. Conversion to a standard truck mixer or agitator, and vice versa, may be made in the field. The new machines are available in 2, 3, 4½, and 5½-yard mixer sizes, with higher ratings for agitators.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 9.

Welding Electrode For Cast-Iron Alloys

A new iron-alloy electrode, Eutectrode 25, has been developed by Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y., for alloy and special cast-iron welds.

The new core alloy is designed to give welds of great strength (60,000 psi) and hardness (Brinell 210-250) and a close color match. Its patented FrigidArc coating eliminates the need for preheating, the company says, and its affinity for the parent metal enables its use on corroded or rusty cast-iron and heavy castings. Sizes available are ⅜ and 5/32 inch.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 91.

Highway Signs and Signals

A new 24-page catalog on highway signs and signals can be secured from the Cataphote Corp., Toledo 10, Ohio. Illustrations, specifications, and complete descriptions are given on the Cataphote line of traffic signs, danger beacons, reflector buttons, and street-name signs. Included is a listing of traffic signs as designated and specified in the Public Roads Administration's "Manual on Uniform Traffic Control Devices for Streets and Highways".

This literature may be obtained from

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Hayward makes all three—clamshell, electric motor, orange peel. A Hayward recommendation is unbiased.



THE HAYWARD CO., 32-36 Day St., New York

Hayward Buckets

the company, or by using the Request Card at page 16. Circle No. 90.

Front-End Loader For Maintainers

A new improved Lift-Loader attachment for the Huber Maintainer has been announced by Huber Mfg. Co., 202 N. Greenwood St., Marion, Ohio. Carrying the standard ¾-cubic-yard bucket, it is designed for loading sand, gravel, crushed stone, etc. from stockpiles. It is hydraulically operated, of the double-cylinder type, and can raise a 1,000-pound load 9 feet 8 inches, dumping at any desired height.

Because the loader mounts on the Maintainer frame at the blade-lift cylinder uprights, it is possible to bring the lip of the bucket, in loading position, to 34¼ inches ahead of the front wheels, the company says.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 31.



A working view of the Lift-Loader on a Huber Maintainer. It is hydraulically operated and can raise a 1,000-pound load 9 feet 8 inches.

QUICK REFERENCE TO MAP TYPE STYLES

A NEW AID TO MAP-MAKING

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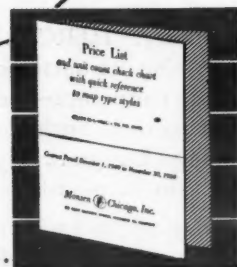
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The adhesive makes every name stick permanently to any dry surface without rubber cement, paste or a wetting agent. Printed on the underside, it is possible to rub each patch down thoroughly without marring the type.

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*Crowder Patents U. S. Pat. Off. Nos. 1830887 and 1963778, and Can. Pat. Off. No. 545496.



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Under simulated disaster conditions, the Kyttoon carries aloft the transmitter-receiver aerial of an emergency radio station and increases its operating radius by more than 100 miles. That's Inventor Domina C. Jalbert in the background at right.

New Engineering Aid For Surveys, Mapping

A new engineering development, a balloon combined with a kite, is designed for use in surveying, aerial mapping, and similar field applications. The Kyttoon, as it is called, was invented by Domina C. Jalbert and is now manufactured by the Dewey & Almy Chemical Co., of Cambridge, Mass.

The unit measures $3\frac{1}{2} \times 8$ feet and is composed of a teardrop-shaped Neoprene bladder within a white Nylon casing. It can be inflated with helium or hydrogen and, with daily use, requires about 70 cubic feet per week. Its stability in flight, holding a target in position, is its chief asset in surveying or aerial mapping. This stems partly from its kite-like ability to "climb the wind" by means of horizontal air foils. But unlike a kite, it will not nose-dive, because it is lighter than air. The Kyttoon may also be used to suspend scientific instruments, radio aeriels in areas where reception is difficult (an aid for highway departments), and signal lights and small floodlights. A single Kyttoon has a lift of $1\frac{1}{2}$ pounds in still air.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 130.

No Melting Point For New Lubricant

A new all-purpose lubricant which, it is claimed, has no melting point, has been developed by the Warren Refining & Chemical Co., 750 Prospect Ave., Cleveland 15, Ohio. Known as Plastilube, it contains none of the metallic soaps of fatty acids found in greases. In addition to its non-melting feature, Plastilube possesses high adhesive qualities, excellent pumpability at low temperatures, and does not break down during working, according to Warren. The product is adaptable for a variety of automotive and industrial uses.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 12.

West-Coast Plant for B-W

The Bendix-Westinghouse Automotive Air Brake Co., Elyria, Ohio, has built a new plant at 2000 5th St., Berkeley, Calif. It contains about 20,000 square feet of floor space for sales, service, and warehousing of new parts, as well as production equipment for rebuilding air-brake units. The plant will be the headquarters of the company's Pacific Division and will service all manufacturers and distributors west of the Rockies.

C. R. Mitchell, formerly Regional Manager at Philadelphia, has been made Division Manager in charge of all operations on the west coast. T. J.

Turek, Division Engineer, will assist him. Mr. Turek was formerly Assistant Research Engineer at the Elyria plant.

Climate and Construction

Ever since the first man crawled into a cave to get out of the rain, buildings have been thought of as a means of keeping the weather out. Man has always taken weather and climate into account when he designed and constructed buildings. But with the progress of building technology, it is now possible to use climatic factors scientifically and make them work for the building, not against it.

This new concept of weather as a partner in construction was behind the Building Research Advisory Board's research correlation conference on "Weather and the Building Industry". The proceedings of this conference are now ready for distribution. They consist of a collection of papers by top-ranking men in building technology and weather sciences. They represent

a complete statement of what is known about climatology in relation to the building industry; they also contain analyses of research in building materials and equipment.

Copies of the conference proceedings may be obtained by writing to the Building Research Advisory Board, National Research Council, 2101 Constitution Ave., Washington 25, D. C. The price is \$3.50.

DeVilbiss Plant in West

A new assembling, warehousing, and distributing plant has been opened by The DeVilbiss Co., Toledo, Ohio, in Santa Clara, Calif. It will serve the territory covered by company sales branches in San Francisco, Los Angeles, and Salt Lake City. Company products include spray-painting equipment, air compressors, hose, booths, etc.



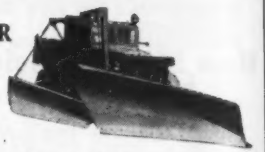
V-Blade Sno-Plows for all sizes and makes of motor trucks—also tractors, motor patrols and locomotives.

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Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Pipe Contractor Was Bound To Safeguard Children at Play

THE PROBLEM: Heavy concrete pipe sections lay on a public playground for installation underground by a municipal sewer contractor. The sections were not anchored and there was no watchman. Plaintiff's 11-year-old son was injured when he rolled one of the sections. Could a jury find from these facts that the contractor was liable?

THE ANSWER: Yes. (Terranella v. Union Building & Construction Co., 70 Atl. 2d 753, decided by the New Jersey Supreme Court.)

At the end of a trial and without a verdict of the jury, the judge of a lower court had ordered the case dismissed both as to the contractor and the city (Passaic), on the ground that the evidence was insufficient to show that either defendant was liable.

The court decided that the suit was properly dismissed as to the city because of a New Jersey statute exempting municipalities from liability for injury to persons using public grounds. But it was decided that the jury should have been permitted to decide whether or not the contractor had used proper care to safeguard playing children.

The Supreme Court reasoned that children are impliedly invited by a city to use a playground, and there was an obligation to use reasonable care for their safety. True, the pipes are not part of the playground equipment, but immature children could not be expected to distinguish "between the equipment which is intended for their use . . . and that which, in an area devoted to their pleasure, is placed within their easy reach . . . but is intended for other purposes." This is especially so in a case like this, where there was no sign, guard, or other provision enabling children to differentiate between what they could play with and what they could not.

The court cited a decision of the Ohio Supreme Court in a similar case where a child was injured while playing about an unanchored conduit pipe in a park. There the court noted that the case was not one of an "attractive nuisance existing upon private property", but of the creation of a dangerous condition in a park to which children, as well as adults, were invited. (Gottesman v. Cleveland, 142 Ohio St. 410, 52 N. E. 2d 644.)

Contract Misrepresents Fill Material Source

THE PROBLEM: A Federal contract to construct a rock-filled dike in Alaska required that the material be obtained from a specified butte, which was represented to be "a solid rock formation". The rock proved to be friable and could not be used without excessive waste.

(1) Was the contractor entitled to modification of the contract to provide for increased pay? (2) Did successive change orders, modifying the specifications as to the rock that could be used and providing that other contract terms should remain unaltered, prevent the contractor from enforcing a provision requiring modification of the agreement to cover cost increase due to unforeseen conditions? (3) If the contractor was entitled to an increase, how should the increase be computed? (4) Could the contractor collect pay to which he was entitled but of which he was deprived over his protest?

THE ANSWERS: (Tobin Quarries, Inc., v. United States, 84 Fed. Supp. 1021, decided by the United States Court of Claims.)

(1) Yes. Despite the innocence of the Government in misrepresenting the character of the rock in the butte, the contractor was entitled to rely upon the mutual supposition "that the rock to be obtained there was suitable for the work, and could be used on a reasonably economical basis".

(2) No. The Court decided that the provisions of three successive change orders concerning the size of the rock to be used and stipulating that other contract terms should remain unaltered, did not exclude the contractor's right to a modification of the contract under Article 4—dealing with unforeseen conditions—as far as work previously done was concerned. The change orders looked only to the future, and contained no provisions except those regarded as adequate to keep the work going in the future. They did not cover work already done.

(3) The increase due to the contractor should be computed as the excess of the actual cost of the work above the cost had no unforeseen conditions been encountered.

(4) Yes. On this point, the court said: "The Government, in issuing Change Order No. 3, reduced the price to be paid for quarry-run rock from the contract price of \$1.09 to 60 cents per cubic yard, which change the contractor protested, saying that it would accept it only in order to finish the

job. For the Government to change the contract price when the contractor was "so involved in the job that it had no choice in the matter, amounted to economic coercion". And the contractor could, therefore collect the original contract price.

Quarry Contract Is Upheld

THE PROBLEM: A South Dakota partnership owned several tracts of adjacent land containing limestone adapted to road construction. It gave plaintiff a 3-year exclusive right to remove rock from one of the tracts on a royalty basis. The contract specified that the partnership would not lease any adjacent or contiguous acreage for rock production during this time.

Defendant company knew of the contract, and used quotations of material prices furnished it by plaintiff to bid on a near-by state road job. Nevertheless it secured rock from adjacent land owned by the partner-

ship. Did plaintiff have a right to maintain a suit to enjoin the partnership from permitting defendant to continue to remove such rock, and to collect damages for rock already removed?

THE ANSWER: Yes. (Lien v. Northwestern Engineering Co., 39 N. W. 2d 483, decided by the South Dakota Supreme Court.)

First, the court applied this well established rule of law: "one who intentionally and without reasonable justification or excuse induces one of the parties to a contract to refuse to perform . . . with resulting damage to the other party . . . may be held

liable." In other words, plaintiff had a good claim for damages against the partnership for breach of contract. And this claim did not preclude plaintiff from pressing suit against defendant for its wrong in knowingly making itself a party to the partnership's breach of contract.

Defendant and its codefendant, the partnership, argued that the contract was void and unenforceable because it violated the South Dakota antimonopoly statutes. Overruling that contention, the court noted that the contract related only to lands owned by

(Concluded on next page)

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Avoid Legal Pitfalls

(Continued from preceding page)
the partnership and did not involve "all or any large portion of such material in the community. Its necessary consequence was not to fix prices, limit production, or suppress competition." The partnership did not agree not to engage in the business of quarrying rock, but merely reasonably agreed that, during the 3 years that its contract with plaintiff was to run, it would not grant similar lease rights to third parties in its other near-by land.

Another unsuccessful defense set up in the suit was that the contract was not binding because it did not impose any obligation by the partnership to remove and pay for any definite quantity of rock. The court said that because the contract stated a consideration (\$1.00) had passed to the partnership, the contract was a valid option for the plaintiff to remove and pay for such rock as he should need during the 3-year period.

There was some argument before the court as to whether the provision of the contract that the partnership would not lease "adjacent or contiguous" lands to third parties applied to lands not bordering upon the land leased to plaintiff. But the court said it was not necessary to answer that question, because the land leased to defendant did border on the land leased to plaintiff.

Finally, the court rejected a contention that plaintiff was not entitled to substantial damages because it did not appear that he had any market for the rock removed by defendant. The court said that since the removal was wrongful to plaintiff, he should be permitted to collect damages equal to the value of the crushed rock removed by defendant, less the cost of production.

Two of the five justices of the South Dakota Supreme Court dissented from the court's decision, on the ground that the contract was void as unreasonably tending to restrain trade. Anyone interested in reading the full text of the contract involved in this case will find it in the dissenting opinion of Judge Hayes (39 N. W. 2d 491) which follows the majority opinion of the court.

Railroad Held Not Liable For Independent Contractor

THE PROBLEM: A railroad engaged a contractor to restore a damaged piling cluster near a drawbridge, and assigned plaintiff of the railroad engineering department to the job "to see that a good job was done" and "keep the job moving". Plaintiff was injured while being hoisted to the top of the piling by the contractor's crew. Was the railroad liable under the Federal Employers' Liability Act?

THE ANSWER: No. (Lees v. Chicago & North Western Ry. Co., 89 N. E. 2d 418, decided by the Illinois Appellate Court.)

It was conceded that the contractor was an "independent contractor". But the plaintiff's lawyers argued that the general rule that the employer of an independent contractor is not liable for his negligence is rendered inapplicable to cases arising under the provisions of the Federal act. The Illinois court rejected that contention. It pointed out that the United States Supreme Court had decided that one who contracted to construct railroad bridge piers according to plans and specifications furnished by the railroad company was an independent contractor for whose negligence he—not the railroad—was liable. (Casement v. Brown, 148 U. S. 615, 13 Sup. Ct. 672.)

The Illinois court also cited one of its own previous decisions to the effect that a railroad company was not liable for injury to an employee of a contractor engaged to grade a right-of-way, due to the contractor's fault. (Boyd v. Chicago & North Western Ry. Co., 217 Ill. 332, 75 N. E. 496.)

The court concluded that the Federal statute does not make a railroad liable for negligence of a contractor engaged in good faith and not merely to exempt the carrier from statutory liability.

Equipment Lessor Liable When Crane Boom Falls

THE PROBLEM: Plaintiff railroad rented from defendant a truck crane to be used in constructing a terminal railroad yard. While the crane was loading a heavy track-cutting machine upon a trailer, a sheave pin of the crane broke causing the boom to fall upon and damage the machine.

The crane rental contract required the defendant to furnish an operator, required the defendant to indemnify the railroad against accidents not due to its negligence, and required the railroad to provide public liability insurance. The railroad failed to provide such insurance. Could the railroad require the defendant to reimburse it for \$3,900 it had to pay the owner of the machine for the damage

done to it?

THE ANSWER: No. (Pennsylvania Railroad Co. v. J. Jacob Shannon & Co., 70 Atl. 2d 321, decided by the Pennsylvania Supreme Court.) The court said:

"If the railroad company had provided such insurance, the insurer would have paid this loss and that would have been an end to the claim unless, of course, the insurer became insolvent. If the Shannon Co. had been obliged to pay the loss, it would have . . . [succeeded] to the railroad company's right on its policy . . . The railroad company's failure to perform its contract prevents recovery from the Shannon Co. on its agreement to indemnify" the company.

The court rejected the railroad's contention that defendant impliedly warranted that the crane was fit for the purpose of loading the heavy machine. Interpreting the contract, the court said that the "railroad company hired a specific piece of equipment—not a piece of equipment for a particular purpose".

But, deciding one minor point in favor of the railroad company, the court decided that the fact that the equipment was leased for the construction of a terminal yard did not show that the company had misused the crane in loading a machine just outside the yard limits. The court said that if in furthering construction of the yard it was necessary to operate outside its limits, the contract permitted such use.

Contractor on Airport Liable For Blasting Damage Near By

THE PROBLEM: Was an airport contractor absolutely liable for damage to buildings, however far away, caused by vibration and concussion due to blasting operations? Or was it necessary for the owners of the buildings to prove that the blasting was done carelessly?

ANSWER: The contractor was liable without proof of negligence. (Britton v. Harrison Construction Co., 87 Fed. Supp. 405, decided by the United States District Court Southern District of West Virginia.)

The opinion of Judge Moore in this case notes the decisions of some state appellate courts as to blasting damage done without negligence, when rocks were thrown against near-by buildings; in such cases the owners were judged entitled to collect, while nothing could be collected if the damage resulted from mere concussion or vibration.

Where such a rule is recognized by the courts of a particular state, a Federal court trying a suit for damages in that state must follow the same rule. But where, as in the case under discussion, the state courts have not decided the point, a Federal court will follow the rule generally applied by Federal courts in such cases. And Judge Moore finds that the Federal courts are practically unanimous in the view that a contractor is just as much liable for damage done by concussion or vibration as by thrown rocks.

Discriminatory Vehicle Taxes

THE PROBLEM: A certain state statute imposes use taxes upon motor vehicles bought in another state and brought into the state for use. Is the statute unconstitutional in exempting vehicles capable of carrying ten passengers or more?

THE ANSWER: Yes. (State on relation of Transport Mfg. & Equipment Co. v. Bates, 224 S. W. 2d 996, decided by the Missouri Supreme Court.)

The company bought a truck-tractor in North Carolina, but the authorities in Missouri refused to register it there unless a 2 per cent use tax were paid. The company sued to compel registration without payment of the tax, and was upheld by the Supreme

Court.

The court declared that the state could impose a sales tax upon vehicles sold within the state and a use tax at the same rate on vehicles brought into the state for use there, provided there was no unjust discrimination. But it was unconstitutional to require payment of taxes on such vehicles as tractors, trucks, etc., and at the same time to exempt busses.



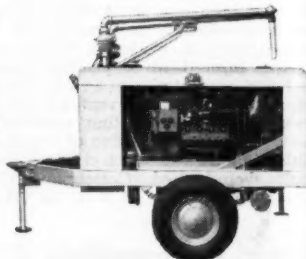
Heat Asphalt Materials Faster!

BROS BITUMINOUS CIRCULATOR AND HEATER

● Attractive . . . streamlined . . . compact . . . the Bros Circulator has no equal for rapid temperature boosting of asphalts, tars, oils and water. It also does double duty as a high speed, high capacity pumping unit for the transfer of material. Power unit is a 95 H.P. Ford V-8 engine . . . parts and service available everywhere. Low center of gravity and proper weight distribution permit safe trailing at fast speeds. Pays its way wherever it works.

AVAILABLE IN SEMI-TRAILER MODEL OR STATIONARY SKID TYPE

Semi-trailer model is mounted on heavy duty leaf springs, Timken bearing axle and heavy duty truck type balloon tires. Adjustable stiff legs hold circulator in position while operating. Skid type circulator is designed for truck mounting or stationary installation in semi-permanent locations.



The Bros Circulator—fastest heating and pumping unit on the market.

BROS

WM. BROS BOILER & MANUFACTURING CO.
Minneapolis 14, Minnesota





For all-round materials handling the Trojan Loadster is available with bucket, crane hook, and dozer attachments.

A One-Yard Loader

A new loader designed for multi-job application has recently been announced by Contractors Machinery Co., Inc., Clinton St., Batavia, N. Y. The Trojan Loadster is available with bucket, crane hook, fork, and dozer blade attachments for all-round materials handling.

The Loadster is powered by a 248-cubic-inch International Harvester Series 6 engine, developing 40 hp at 1,450 rpm. The 14.00 x 24 drive-wheel tires are designed to add extra ground contact for traction and flotation. Buckets for general utility, loose material, or snow work have capacities of $\frac{3}{4}$, 1, and $1\frac{1}{4}$ cubic yards respectively. The unit has a lifting capacity of 4,200 pounds and a maximum dumping clearance of 8 feet. Reverse curve bucket arms are designed to prevent hands, arms, or legs getting caught under the arms, even when the bucket is in its highest position.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 29.

New Welding Gloves

Three new styles of welding gloves have been announced by Air Reduction Sales Co., 60 E. 42nd St., N. Y. 17, N. Y. The A gloves are made of carpincho leather with wool-lined backs, for maximum heat resistance. A one-piece leather back, which includes fingers and gauntlet, is designed to eliminate exposed seams and to increase the life of the glove. The B gloves are a gauntlet type offering the same construction features as the A. These gloves have palm, thumb, and fingers made of chrome-tanned horsesplit, with No. 1 cowsplit back. The C gloves offer construction features similar to those of the B but with a two-piece lined leather gauntlet. All three gloves are medium-full size.

Further information may be secured from the company by requesting Catalog 13 or by using the Request Card at page 16. Circle No. 55.

Bulletin on Wheelbarrows

A circular describing various types of wheelbarrows is offered by the Lansing Co., Lansing, Mich. Described in the circular are tubular barrows, general-purpose barrows, and three carriers for concrete. Brief specifications and illustrations of each product are given.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 127.

Raybestos Moves in New York

Raybestos-Manhattan, Inc., has moved its New York City offices from the Equitable Bldg. at 120 Broadway to 500 Fifth Ave. Offices included in the move are the New York and New England district office of the Manhattan Rubber Division and the Corporation Export Department including Allied Asbestos & Rubber Co. (Export) Inc. The Department of Marketing and Merchandising, formerly at 120 Broadway, has been moved to the corpora-

tion's executive headquarters, 61 Willett St., Passaic, N. J.

Surveying Instruments

Two new folders describing precision-built engineer's levels and transits have been issued by the Brunson Instrument Co., 1405 Walnut St., Kansas City, Mo. Complete specifications of the optical and mechanical construction features are given.

The equipment presented in the bulletins includes the No. 50 engineer's transit with a $6\frac{1}{4}$ -inch limb, graduated to 1 minute, 30 seconds, or 20 seconds; the No. 30 light mountain transit with a $5\frac{1}{2}$ -inch limb, graduated to 1 minute; and a No. 55 wye level and No. 45 dumpy level, both with an 18-inch telescope and 32-power magnification. Other products briefly described include a builder's level, hand level, Kansas City rods, and tripods.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 131.

Check these advantages!

Compare the Features of the High Discharge Transport Truck Mixer:



Write for full details on this durable, efficient mixer.

- ✓ VISIBLE MIXING
- ✓ FAST OPEN TOP CHARGING
- ✓ FULL VIEW INSPECTION
- ✓ ALL STEEL CONSTRUCTION
- ✓ SUPERIOR MIXING ASSURES QUALITY CONCRETE
- ✓ ALL BEARINGS FULLY PROTECTED FOR LOW MAINTENANCE

CONCRETE TRANSPORT MIXER CO., INC.

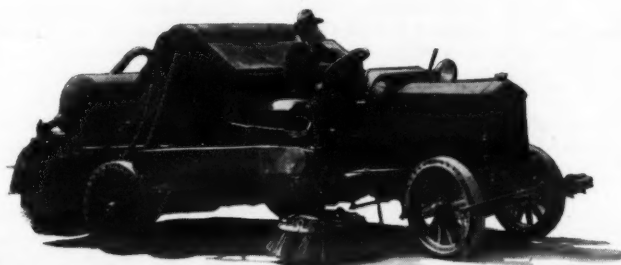
4984 Fyler Ave.

St. Louis 9, Missouri

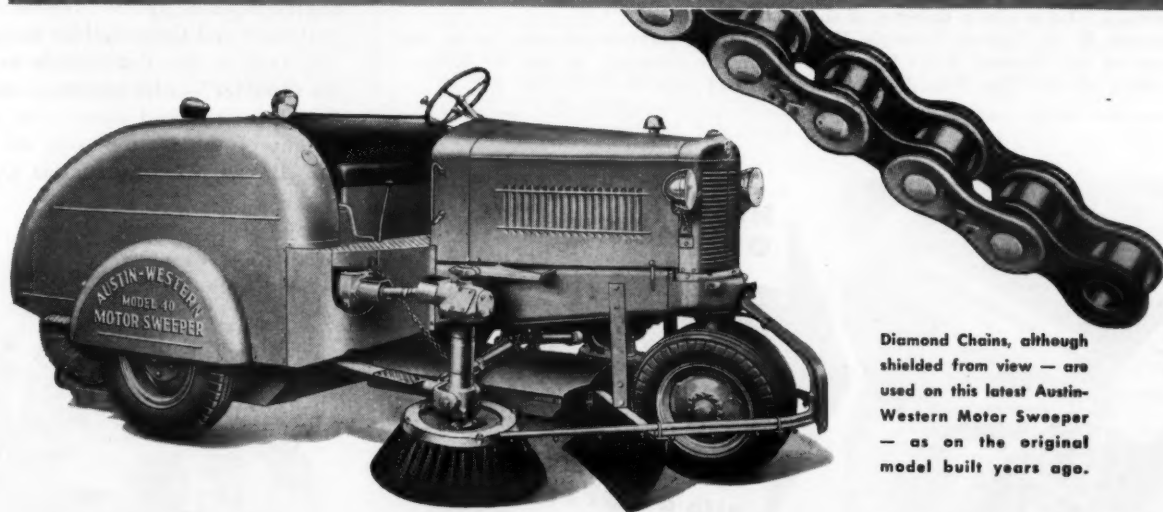
On the Original—and



The first Motor Sweeper Equipped with a Gutter Broom



On the Latest Austin-Western Motor Sweeper



Diamond Chains, although shielded from view — are used on this latest Austin-Western Motor Sweeper — as on the original model built years ago.

DIAMOND ROLLER CHAINS

On so many early models of machinery and equipment Diamond Roller Chain Drives were incorporated as original equipment . . . Today, too, you can find Diamond drives on the streamlined, high speed models that meet present day requirements.

As a result of the long years of cooperation between machinery builders and the Diamond

engineering staff, you too may find the practical suggestions on chain drives well worthwhile. DIAMOND CHAIN COMPANY, Inc., Dept. 487, 402 Kentucky Avenue, Indianapolis 7, Indiana.

Offices and Distributors in all principal cities.

Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND



ROLLER CHAINS

Tunnel Forms Moved By Gantry and D8's

B. Perini & Sons, Inc., of Framingham, Mass., contractor on the \$13,767,-843 Squirrel Hill tunnel job near Pittsburgh, Pa., has started concreting the second tunnel. The seven 50-foot steel concrete forms used for the first tunnel are being reused in the second. Instead of dismantling and reconstructing them at the second tunnel, the contractor mounted the forms on a huge gantry and placed the total weight of 110 tons on two Caterpillar D8 track-type tractors. The tractors then hauled the forms to the next tunnel entrance.

A natural wall which extends beyond the entrances of the two tunnels, and a huge concrete wall built for a bridge overpass near the tunnel entrances, prohibited shifting the gantry and forms from one tunnel to another without angling the forms between these two obstacles. By maneuvering the forms with the D8's the Project Manager was able to move them in a matter of hours.

Once placed inside the tunnel, one form holds the concrete while the other is rolled through on a special traveling carriage and set up for the next concrete placement. Concrete is pumped into the space between the rock walls or ceiling of the tunnel and the metal forms.

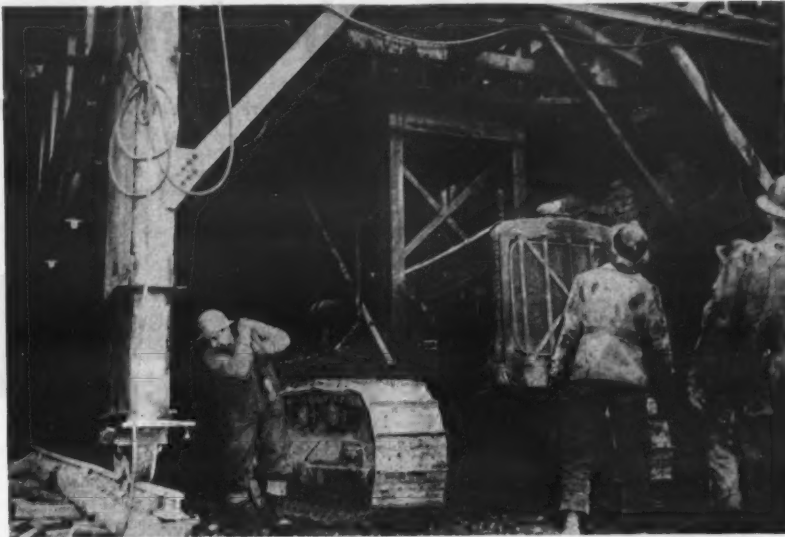
Surface Protection

A new corrosion and oxidation-resistant coating, End-O-Rust, has recently been produced by End-O-Rust Inc., 1900 Euclid Ave., Cleveland, Ohio. Although created primarily for use on metals, the product is also applicable for protecting concrete, wood, fibre or other surfaces, the company says.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 18.

New Executives for Kewanee

The new President of Kewanee Boiler Corp., Kewanee, Ill., is W. B. Russell. He fills the vacancy created by the death of R. B. Dickson on April 9. Mr. Russell has moved from Time Study Engineer to Assistant to the President, to Vice President, and then President. He is also a director of the company. E. M. Palmer, formerly Vice President and General Sales Manager, has been elected Vice President.



To move concrete forms from one tunnel to another at Squirrel Hill, B. Perini & Sons mounted them on a gantry and used two Caterpillar D8's to carry the 110-ton weight. Here the gantry wheels are hydraulically raised from the rails and the entire weight of the gantry front is placed on this D8.

Gas-Turbine Power Tested for Trucks

Preliminary road tests of the world's first gas-turbine-powered truck, using an experimental Boeing 175-hp turbine, were successful, according to an announcement by the Boeing Airplane Co., Seattle 14, Wash. Trial runs of the new 200-pound Boeing power plant were made in a 10-ton Kenworth Motor Truck Corp. chassis.

The gas turbine is similar to the jet airplane engine in its general design, but with the power harnessed by a secondary turbine to turn a shaft, rather than exhausted as a jet thrust. The new engine operates quietly, it is said, and has exhaust gases with temperatures approximating those of standard diesel and gasoline engines. According to the manufacturer, the turbine runs equally well on gasoline, kerosene, light or heavy fuel oil, or "bottled" gas.

Several features of the new engine are of interest to truck and car operators. It needs no cooling system and less gear shifting. It can start and immediately develop full power without warm-up. It cannot stall. It is lightweight, compact, and of simple construction.

Further information may be secured from the company, or use the Request Card at page 16. Circle No. 102.

Bookkeeping for Contractors

A folder describing the Tarco single-entry bookkeeping system for contracting jobs has been put out by Tallman Robbins & Co., 314 W. Superior St., Chicago 10, Ill. The literature points out that this system is a business tool designed for contractors, subcontractors, and builders who require a simple easy-to-keep easy-to-understand record of their jobs. It records cash income and outgo, payroll, cost information, and tax data—all in one place.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 88.

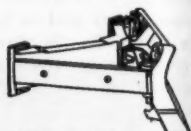
Cataphote Opens New Plant

The Cataphote Corp., of Toledo, Ohio, has established a new plant in Flowood, a suburb of Jackson, Miss., to turn out glass spheres and beads for highway striping, highway signs, and airport markings. C. W. Hudson is Plant Manager.

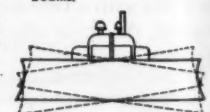


Positive Down-Pressure ... Direct Lift

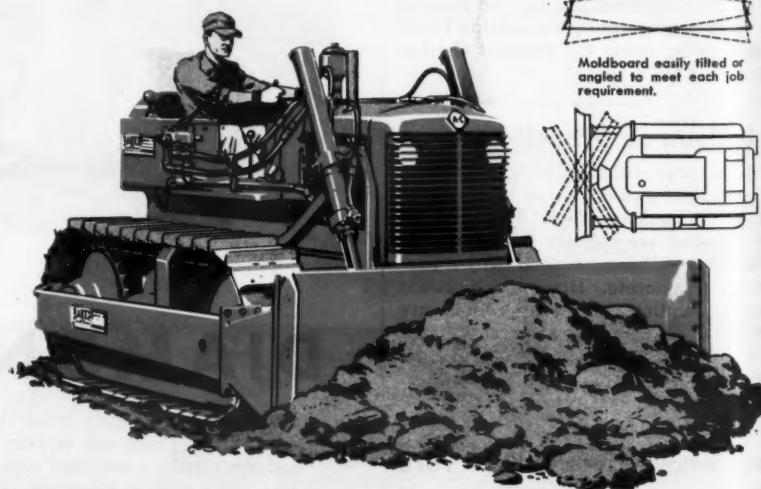
These are the twin features provided by the twin engine-mounted hydraulic cylinders in the new Baker Bulldozer and Grader designed for the HD-5 A-C Tractor. The Baker blade works "straight from the shoulder"—with hydraulic action so positive that the blade is forced down until virtually the entire weight of the tractor rests on the cutting edge. THE BAKER MANUFACTURING CO., Springfield, Ill.



Bulldozer and Grader blade interchangeable; just bolt the necessary blade to the standard push-beams.



Moldboard easily tilted or angled to meet each job requirement.



P.S.: Baker is the PIONEER and the SPECIALIST in bulldozers



HIRE ONE MAN
and get a crew
with a COFFING SAFETY-PULL HOIST

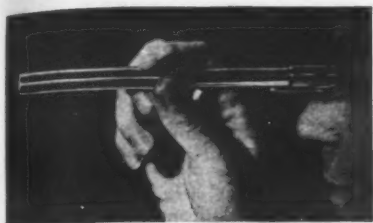
One man with a Safety-Pull Ratchet Lever Hoist does the lifting, pulling, holding work of many — on the job or in the shop. Even the smallest Safety-Pull, weighing only 14 lb., delivers a 1500-lb. vertical or horizontal pull—is ready to go to work wherever hooked. Raising heavy structural members, lifting, shifting or servicing equipment—these are but a few of the jobs it handles easily, safely.

All Safety-Pulls are tested at 100 percent overload. Dual ratchet and pawl construction cannot slip—holds securely in any position. Choice of nine sizes with capacities up to 30,000 lb. Send for Bulletin C6SP.



Quick-Lift Electric Hoists •
Hoist-Alls • Mighty-Midget
Pullers • Spur-Geared Hoists
• Differential Chain Hoists
• Load Binders
• I-Beam Trolleys

COFFING HOIST COMPANY
Danville, Illinois



It may look like a fountain pen, but it's a six-power pocket telescope.

Six-Power Telescope Clips in the Pocket

A six-power pocket telescope, fountain-pen size, is being made by Pan-Technics, Ltd., of Encinitas, Calif. Applicable for checking grade stakes, elevation signs, center-line marker flags, etc., the Penscope is 5 inches long and weighs 2 ounces. It is a precision instrument with a full six-power magnification and a field of view of 315 feet at 1,000 yards.

The optical system of six coated lenses is fully corrected for spherical and color aberration, coma, and astigmatism, the company states. The Penscope clips in the pocket like a fountain pen. Its construction permits quick fingertip focusing. Its surface is satin-chrome-finished.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 125.

Powder-Driver Tool Has Automatic Firing

Positive and easier automatic firing-pin action, with no misfires or delays, is claimed for the newly designed powder-actuated tools manufactured by the Mine Safety Appliances Co., Braddock, Thomas, & Meade Sts., Pittsburgh, Pa. Feature of the MSA Velocity-Powder driver is a spring-impelled firing pin that is designed to eliminate the human factor in firing a stud-cartridge unit.

Speed and force of the forward motion in firing is no longer important to the operation, the company says. Regardless of the slowness of pressure application the tool may still be operated satisfactorily. This enables its use in closely confined locations without misfiring due to hesitation. The safety features of the new tool have not been affected by the design change, MSA engineers said.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 27.

One-Yard Excavator Fully Air-Controlled

A new 1-cubic-yard-capacity excavator and material handler, the Model 420, is now being produced by The General Excavator Co., of Marion, Ohio. It features air control of all major motions: swinging, hoisting, steering, boom hoist (up and down), swing brake, shovel crowd and retract, and shovel dipper trip. Patented air cushion clutches are used on the swing reversing shaft and the countershaft. The operator sits before a bank of short throw levers and controls metering valves which apply the air pressure yet allow him to retain the feel of the load.

The Model 420 is offered as a shovel, dragline, clamshell, lifting crane, hoe, pile driver, and magnet crane. It is interchangeable in the field. A choice of diesel or gasoline power is given. Additional standard features are the independent travel and the independent boom hoist. A special transmission on the deck, driven by multiple-strand roller chain from the countershaft, provides two speeds, forward and reverse.

The superstructure is secured to the crawlers by means of a gudgeon in the crawler frame and four adjustable hook rollers. Deck gears are recessed and operate in an oil bath. Air-controlled steering brakes and clutches are operated completely from the operator's position. Bevel gears in the crawler are enclosed and run in oil. Wide-tread links mounted on long crawler frames, provide stability. Both driving chains and tread belts are adjustable for proper operating tension.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 80.



All major motions of the General Model 420 1-cubic-yard excavator are air-controlled. Independent travel and boom hoist are standard.



IT'S A SHOVEL

Model HM
4-WHEEL DRIVE
PAYLOADER
SPEED -
POWER -
TRACTION -
Versatility

The Model HM Payloader is a complete Hough-built unit... a powerful 1½ cu. yd. tractor shovel with large pneumatic tires, 4-wheel drive and four speeds in each direction. It has the power, traction and flotation to work on all kinds of ground... to dig, load, carry, grade, level and spread... converts in a few minutes to a bulldozer, a crane, or a "V" snowplow. Not a fair weather worker, but a year 'round tool.

HM versatility is backed by many other outstanding Payloader advantages... power-booster steering, 76 h.p. gasoline or diesel engine, double-acting hydraulic boom and bucket control, unequalled operator comfort and visibility. The complete HM Payloader story is yours for the asking. See your Hough Distributor, or write The Frank G. Hough Co., 762 Sunnyside Avenue, Libertyville, Illinois.

SEND for HM catalog, or literature on other Payloaders — the 1¼ yd. Model HL, the ¾ yd. HF, the ½ yd. HE, the 12 cu. ft. HA.



A BULLDOZER



A CRANE

AMERICAN Deluxe Concrete WHEELBARROW

Code
PERFECT
18 Gauge
seamless tray



The American Steel Scraper Co.
SIDNEY OHIO



HOUGH PAYLOADER
Manufactured by THE FRANK G. HOUGH CO.



Crew Lays Drains at Amazing Speed

★ WHEN the New Mexico State Highway Department designed an improved multiple-pipe drain structure, contractors quickly developed a new method of installation. The result is an advanced technique of laying pipe and back-filling.

The procedure was first developed by Contractor W. T. Bookout on a 12-mile stretch of U. S. 80 between Deming and Las Cruces. Methods and equipment have now been perfected between Lordsburg and Deming on the same

highway. The crew has hit a high mark of one 4-foot joint every 2 minutes, or 1,200 linear feet a shift.

There is no lost motion.

How come all this rush on drains? In the 20.6-mile job which Skousen-Hise Contracting Co. is doing, there are 50,480 feet of 30 and 36-inch concrete pipe. They lie in rows which extend across the base of fills. As many as 49 rows were specified for one structure in the Skousen-Hise project. On the Bookout job there were 183.

Highway engineers designed the improved drain to pass flood run-off through the new route. It, too, is an improvement, for it is slightly raised above the surrounding terrain.

With almost 10 miles of pipe to lay, speed was vital. The pipe crew had to keep ahead of grading equipment. Moreover, specifications called for the pipe to be laid in a circular bed congruent to the pipe shape.

Superintendents on both the Bookout and Skousen-Hise projects give credit

to Foreman Wilbur Hare of Bloomfield, who saw the technique through from the start. He also developed special equipment.

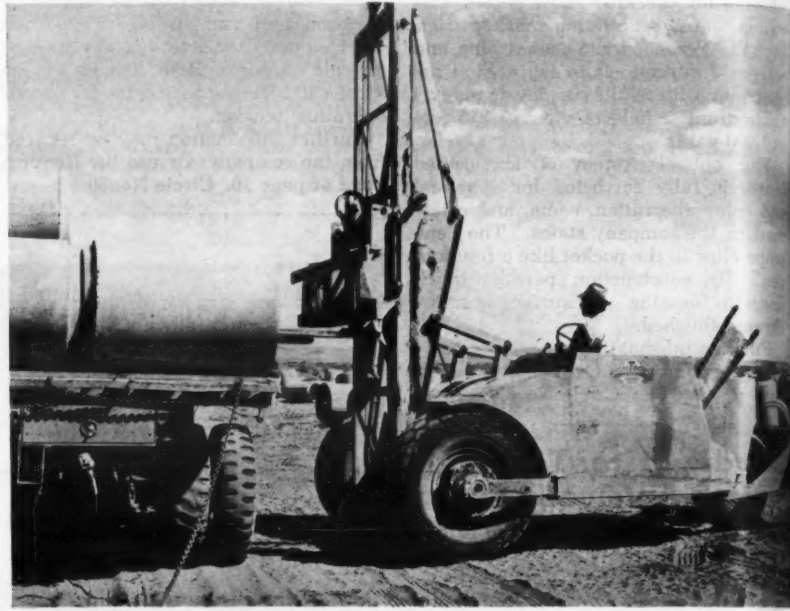
Equipment

Here is the equipment, in the order in which it is used:

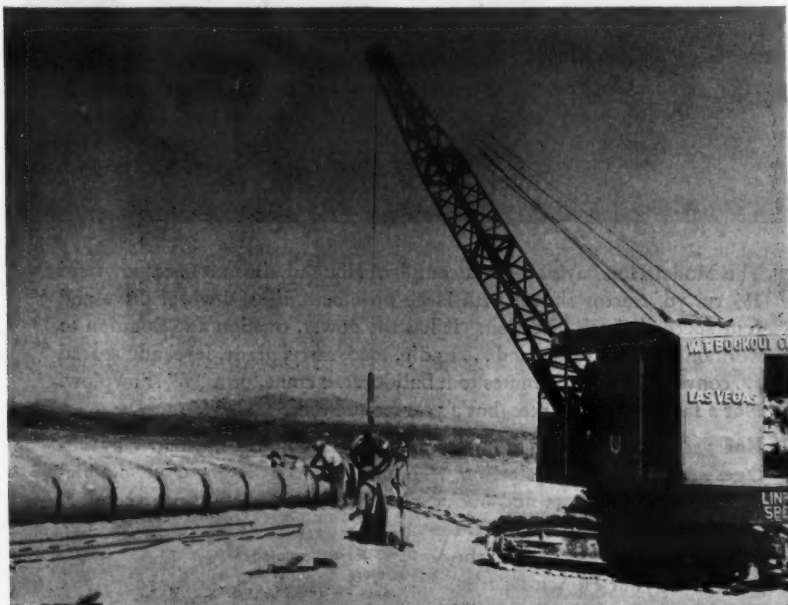
Cats and Carryalls from the grading fleet excavate the site for each structure. Dirt from this excavation is stockpiled in two equal heaps, one on each side of the site. There is a Wagner



1. A new kind of desert cactus—concrete drain pipe for U. S. 80 in New Mexico.



2. A Wagner Duo-Way Scoop unloads the 1,460-pound sections from haul trucks.



5. There a crane picks them up and swings them over the placing points.



6. Meanwhile, a curved template riding on a special frame cuts the next trenches.



9. Using a dragline bucket, a crane then scatters dirt between the rows, and...



10. Chicago Pneumatic Triplex tampers go to work to compact the backfill.

Places 1,200 Feet of 30 and 36-Inch Concrete Pipe in Single Shift On Highway Project; Backfill Tamping Keeps Right Up

Duo-Way Scoop, which has pipe-lifting hooks on one end and a bulldozer blade on the other. A special blade, fitted with teeth, bolts to the dozer. These teeth plow the site and loosen the soil where the pipe will lie.

Special equipment designed and made under Wilbur Hare's supervision comes next. There is a special 35-foot guide frame, made of 2-inch pipe, with extensions to fit bases of variable widths. This frame is accompanied by a curved steel template. Riding on the pipe

frame, this template cuts the curved trench in which the pipe is laid.

There is a Northwest $\frac{3}{4}$ -yard drag-line. It also doubles as a pipe-laying crane. Finally, there's the tamping equipment. It includes a 315-foot Ingersoll-Rand compressor, one Cleveland pneumatic tamper, and four new Triplex tampers, distributed in this territory by Gunderson-Taylor Machinery Co. of Denver.

The crew consists of nine men. Let's go to work.

Methods

Pipe is manufactured in El Paso by Tellyer Concrete Pipe Co. Trucks climb west, rising to the Continental Divide, where the 20-mile project is located. The Wagner Duo-Way Scoop helps to unload them at the site of each structure. Each section weighs 1,460 pounds. The scoop handles two pieces at once.

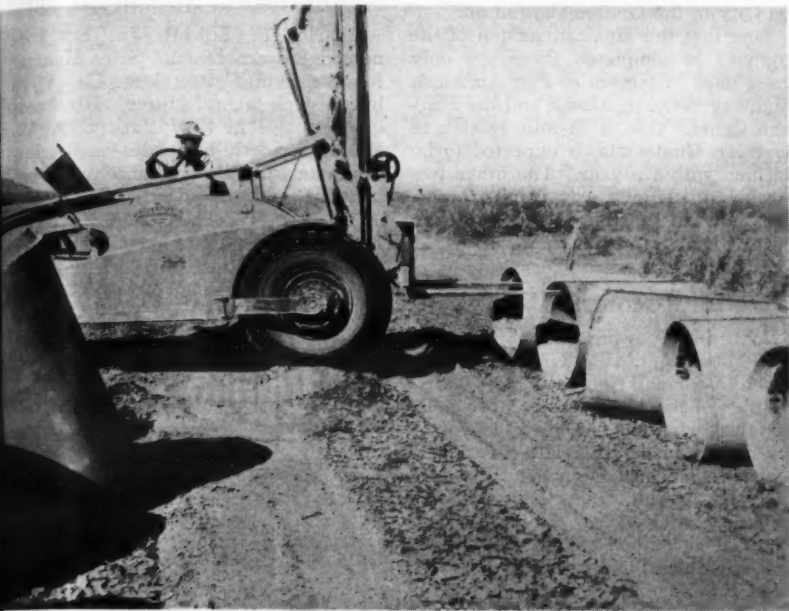
Pipe placing calls for the Northwest crane to spot itself four lines east of the west side of the structure. There's a reason for the crew's preference to build from west to east. The prevailing wind whistles in from the west: By working with the wind, dust is blown

away from the men rather than into their eyes.

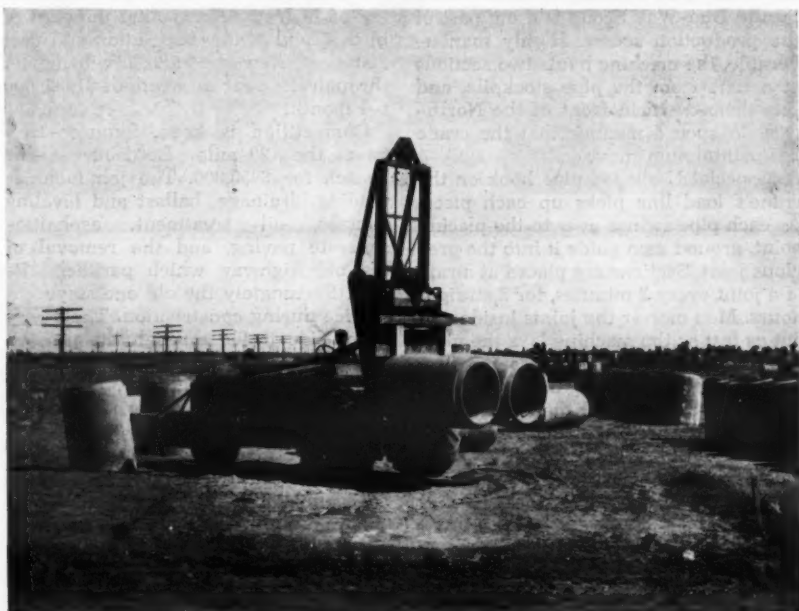
Blue-tops mark the end of each line of pipe. These are set by surveyors after the Wagner Duo-Way Scoop has plowed the site. That loosens the sandy ground to a depth of about 5 or 6 inches. The pipe frame is now brought in to the westerly row. Its center point is set down over the tack in the blue-top. If two settings of the 35-foot template are necessary to trench through the site, the other end is set to a string line.

Three men then use the curved steel template to scoop and shape the loose

(Concluded on next page)



3. As sections are needed, the Scoop picks them up from the pipe stockpile and . . .



4. hauls them two at a time to the row of the drain structure being placed.



7. Pipe sections go in at the rate of a joint every 2 minutes, or 1,200 feet a shift.



8. Workmen mortar the joints inside and out as fast as the crane places the sections.



11. The multiple-pipe drains on the W. T. Bookout job required 183 rows of pipe.



12. The New Mexico Highway Department designed the drain structure for flood run-off.

Crew Lays Drains At Amazing Speed

(Continued from preceding page)

material. Excess dirt is thrown off to one side. The pipe frame has a built-in camber of 2½ inches. If the fills ever settle there will not be a swale in the pipes, and drainage will be generally improved. When the men have finished the preparation of the westerly line, they move over 5 feet and repeat the operation for the next row while the crane is busy setting the first row.

The crane now begins to set pipe. According to Superintendent Andy Isbell, accurate spotting of each section by the Duo-Way Scoop is a big part of the production secret. Highly maneuverable, the machine hauls two sections at a time from the pipe stockpile, and sets them down in front of the Northwest in such a manner that the crane has a minimum move.

A special U-shaped pipe hook on the crane's load line picks up each piece. As each pipe swings over to the placing point, ground men guide it into the previous joint. Sections are placed at a rate of a joint every 2 minutes, for 8 straight hours. Men mortar the joints inside and out as fast as the machine lays the pipe.

By the time the crane has the first row finished, the fine-grade men have another bed ready and the operation is thus repeated until a structure is complete. As a rule the crew will lay pipe until it catches up with deliveries from El Paso. Then it drops behind and backfills.

Backfill Fast, Too!

Consider a crew of 9 men, placing from 288 to 300 cubic yards of structure backfill around the close confines of these multiple pipes, and you have some idea of the progress.

Several days before a structure is to be backfilled, tank trucks run over the dirt piles and deposit the water the earth requires. This gives the moisture a chance to equalize. It minimizes dust. It is the most favorable way to develop 95 per cent compaction required by specifications. (Actually, compaction tests exceed it, often passing 100.)

Changing to a Hendrix ¾-yard dragline bucket, the Northwest now moves in and scatters dirt between the pipes. The void up to spring line is usually tamped by the single Cleveland pneumatic machine. The space between each row is handled by the four triple-tamping units.

Hare's mechanical genius showed up again on the latter machines. They were originally designed to take air through the handles, but Hare devised a change which made them easier to use. He had a welder cut an opening on the opposite side of the head, and the handle holes were plugged. The machine worked so well then that the other three were soon converted too. All they now require is a little pressure on the handles to hold them upright. The three Chicago Pneumatic tampers in each unit do the rest.

Each unit consists of three pneumatic tampers, an air-intake head, and an expansion chamber which feeds air under equal pressure to all three tampers.

While five tamper operators work, the other four men help to spread the dirt which the dragline has scattered. A bit of casting is sometimes necessary. Once the Northwest had to reach halfway across a structure 102 feet wide. Generally speaking, however, the method of spreading the dirt has been satisfactory.

Backfill is tamped 8 inches over the top of pipe. There are 18 cubic yards between each line of pipe. Hare's crew fills around 16 average-width lines in a day. That's 288 cubic yards. His boys had better do that much or Hare does not consider he's done a day's work. There are few exceptions, as Project

Engineer W. E. Brown and Superintendent Andy Isbell will testify.

By working and thinking about this drain-pipe problem—and it was a problem until his solution made it look easy—Hare has become somewhat of a field authority. His work is much appreciated by the contractors. They thought enough of him to get the equipment he recommended to introduce the technique. There have been no grading delays on account of the complex multiple-pipe drain structures.

A New Highway

Matching the speed of construction, the New Mexico State Highway Department in 1950 is shooting for a schedule of highway contracting unheard of in this land of low population and vast distances. New contracts are being let through the year at a rate of \$1,000,000 per month.

Competition is keen. Skousen-Hise took the 20-mile Lordsburg-Separ stretch for \$950,000. The job includes grading, drainage, ballast and leveling courses, oil treatment, asphaltic-concrete paving, and the removal of the old highway which parallels the new. Fortunately the old one stayed in service during construction. There was no outside traffic through the project.

The 20.6-mile total is divided into two Federal-Aid contracts, numbered F1-134 (2) and F1-134 (3). The State Highway Department obtained right-of-way for a future multiple-lane expansion when it is needed. That may be soon, since the project is on the famous "Southern Route" to Arizona and California.

New construction consists of a 24-foot AC pavement centered over a 32-foot oil-processed base. The granular ballast

course measures 44 feet shoulder to shoulder. It is high-type desert construction, designed to give a prompt answer to the southwest's urgent traffic problem.

Pan American Highway Is Opened in Mexico

The Mexican Government opened its section of the Pan American Highway on May 5 with an international automobile race. This 2,177-mile road is divided into two parts: the Central Highway from Ciudad Juarez, on the Rio Grande, to Mexico City, and the Christopher Columbus Highway from Mexico City to the Guatemalan border.

Now that the Mexican section of the highway is completed there are only three gaps in the entire Pan American Highway between Alaska and the Panama Canal. One, a 25-mile stretch in northern Guatemala, is expected to be finished within a year. The other two breaks, still a long way from completion, are in northern and southern Costa Rica.

General Motors Ups Kyes

Roger M. Kyes has been made General Manager of the GMC Truck & Coach Division of General Motors Corp., Pontiac, Mich. He succeeds Morgan D. Douglas who is taking a leave of absence because of ill health. Mr. Kyes, Assistant General Manager of GMC Truck & Coach since last October, joined General Motors in 1948 as Director of its central-office Procurement and Schedules Staff.

Mr. Kyes has also been made a Vice President of General Motors Corp.

Portable-Compressor Data

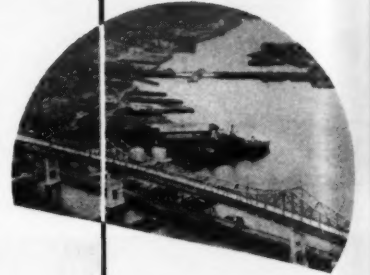
A new broadside on the Blue Brute 60 portable compressor has been prepared by the Worthington Pump & Machinery Corp., of Harrison, N. J. A useful table in Bulletin H-850-B71 indicates the number of pneumatic tools that the compressor can operate simultaneously. Complete construction and mechanical features are highlighted and illustrated with photographs and cross-section drawings.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 103.

Duff-Norton Names Ellicott

Charles R. Ellicott, Jr., has been named Eastern District Sales Manager for the Duff-Norton Mfg. Co., Pittsburgh jack manufacturer. His headquarters are in New York City. Mr. Ellicott formerly held sales-engineering positions with Westinghouse and Symington-Gould.

OVER the water...



The Mystic River Bridge, Boston, was paved with Darex AEA concrete to increase resistance of pavement to freezing, thawing, and de-icing salt action. Photo courtesy of BOSTON HERALD.

In the Shadow Mountain Dam Spillway, near Grand Lake, Colo., Darex AEA concrete was used because of its increased workability, greater resistance to freezing and thawing. Photo courtesy of Bureau of Reclamation.



... UNDER the water

Darex AEA is a catalyzed air entraining agent, specifically formulated for making air entrained concrete. Darex AEA is being used in all types of concrete, all over the world.

Darex AEA is conveniently available in distributor warehouse stocks throughout North and South America and in most foreign countries.

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BAKER-ROOS, INC.

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The Dyn-O-Luber greasing outfit consists of a loading pump in a steel cover which fits standard original lubricant containers, and a grease gun which is detached for use once it's loaded.

New Greasing Outfit Uses Detachable Guns

Two new models of a portable one-hand-operated greasing outfit have been announced by the Alemite Division of Stewart-Warner Corp., 1826 Diversey Parkway, Chicago 14, Ill. Model 7185-A, called the Dyn-O-Luber, is equipped with a Dyn-O-Mite gun weighing 2 pounds and greases up to 55 bearings, the company says. Model 7185-B, the Dyn-O-Pistol, has a gun with a 9-ounce capacity.

Two elements comprise this new greasing outfit—a loading pump and a grease gun. The loading pump is mounted in a rigid steel cover which fits the top of any standard 25 or 35-pound original lubricant bucket or pail, replacing the original container cover. A simple set screw on the grease tube adjusts to hold the cover at the required height for either a 25 or 35-pound bucket. With a few strokes of the pump handle the gun is filled with lubricant through a loader valve on the pump and a loader fitting on the gun. The gun is then uncoupled and is ready for use.

Pressure of grease delivery at the fitting is controlled by the operator to fit the requirements of the bearing being serviced. It is possible with either gun, by exerting extreme "push-action", to effect up to 10,000-psi delivery pressure on "frozen" bearings, according to the company.

The use of detachable guns for actual delivery of grease to the lubricant fitting eliminates transfer of lubricant, increases utility of the outfit in servicing all bearings regardless of location, and preserves all advantages of high-pressure delivery of lubricant, Alemite says.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 63.

Rock and Earth-Boring Rigs

A circular describing the McCarthy rock and earth-boring trench machine has been issued by the Salem Tool Co., S. Ellsworth Ave., Salem, Ohio. Specifically designed for boring under highways, railroads, and right-of-ways without disturbing surface traffic, the McCarthy borer can handle augers from 4 to 16 inches in diameter. Mechanical features and applications are described and illustrated in the circular.

For heavy-duty work, there is a McCarthy earth-boring drill which will handle augers up to 30 inches in diameter. Though called a coal drill, it also has application in the construction field. A circular describing and illustrating this model is also available.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 87.

Republic Rubber News

Howard H. Sprinkle is now Assistant Sales Manager of the Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, Ohio. With Republic since 1923, Mr. Sprinkle has been a sales

representative in the Cleveland and Buffalo areas since 1933.

New Dredge for Gulf Coast

A new hydraulic dredge, named for a man who pioneered Gulf Coast waterways development, is scheduled soon to slide down the ways at the Port Lavaca, Texas, yard of Bauer-Smith Dredging Co. She is the C. S. E. Holland, a 20-inch standard cutter-head type of rig designed to handle ordinary Gulf Coast channel dredging.

The Holland was designed originally for commercial shell dredging, but Bauer-Smith was the successful bidder on so many channel jobs that the dredge is being converted for that work.

Her steel hull is 92½ x 26 feet, and was fabricated by Maxon Iron Works. She will have the usual type of frame, ladder, and cabin. The spuds will be 24 inches square, of hollow steel, set outside the hull.

The dredge is to be a diesel-electric rig, with electric controls. The pump

and winding gear is being manufactured to Bauer-Smith's specifications by Mobile Pulley & Iron Works at Mobile, Ala. Winding gear and auxiliary equipment will be electrically powered by a 500-hp General Motors diesel-generator unit. The pump is to

be driven direct by a 1,000-hp General Motors diesel.

The Holland will have a 24-inch suction and 20-inch discharge. Compared to other dredges in the Bauer-Smith fleet, she is midway between the smallest and the largest.



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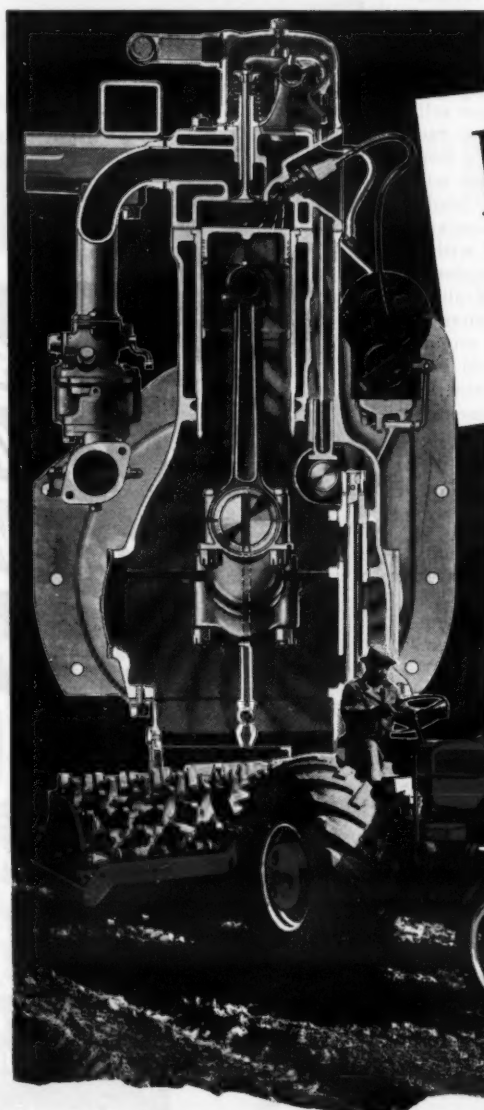
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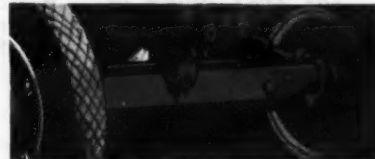
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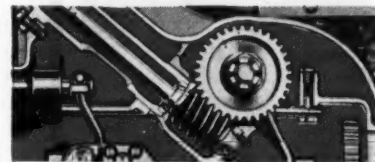


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VALVE-IN-HEAD ENGINE

**ALL-AROUND
STRENGTH
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INDUSTRIAL
TRACTORS**



Extra-strong front axles on all Case industrial tractors take in stride the added burdens of front-mounted hydraulic loaders, sweepers, snowplows, scrapers and dozers.



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● The Case Model "LAI" tractor engine... shown in section above... has a stroke 30 percent greater than the bore. This, with valve-in-head design, permits the compact compression space that invites smooth, complete combustion... consistent fuel economy... persistent pulling power down to 40 percent under rated speed. Moderate piston speed and moderate loading of husky bearings on a big 3-bearing shaft help to make the heavy-duty engine that has set a world standard for tractor ENDURANCE.

Similar engine construction in all four sizes... plus similar strength and endurance in clutch, transmission and final drive... give Case industrial tractors their long-run reliability and economy. J. I. Case Co., Racine, Wis.

Starter and lights are standard equipment at standard price. In completeness of equipment and convenience of operation, as well as quality, Case tractors give extra values.

Your Case industrial dealer invites you to inspect his convenient location, competent staff, and modern service facilities. He offers Case tractors in four basic sizes from 2500 to more than 10,000 pounds... Case highway and airport mowers... complete engine units in four sizes from 24 to 61 H.P. He also offers related equipment such as tractor-mounted loaders, sweepers, snowplows, scrapers and bulldozers—all selected to suit the characteristics of Case tractors and the operating conditions that prevail in your area. He will gladly give you the benefit of his broad experience in power and equipment applications similar to yours.

CASE...

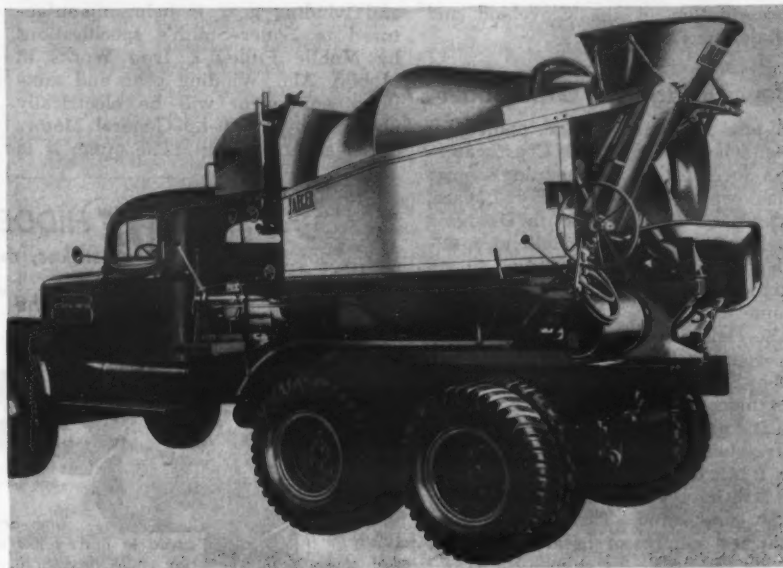


Mixers and Agitators With Improved Design

Weight reductions ranging from 600 to 1,600 pounds have been effected by design improvements on Payloader truck mixers, to comply with strict load limitations while carrying larger payloads, the Jaeger Machine Co., Columbus 16, Ohio, announces. Reductions of 9 to 13 inches in frame length—with shorter cab-to-axle requirement and the load center further forward—facilitate mounting on short wheelbase trucks, the company points out.

Jaeger Payloader models are offered in 2, 3, 4½, and 5½-cubic-yard sizes as truck mixers and 3, 4¼, 6½, and 7¾-yard sizes as agitators. Sealed-drum models with air-tight rear discharge door are available for wet-mix plant operation.

A number of features are claimed for the new unit. A new hopper design makes possible faster end-loading; pre-mixed or shrink-mixed materials can be charged in one drop through a top



Reductions in weights and frame lengths have been effected on the new Jaeger Payloader truck mixers to meet strict load limitations.

door which is equipped with new quick-opening toggle lock. A fully retractable loading hopper permits unimpeded discharge, and a two-speed transmission permits revolving the drum at high speed for fast discharge. Water distribution is provided by a Jaeger self-priming pump designed to deliver metered water at 100 gpm through a clog-proof jet. Drums are equipped with die-shaped continuous spiral blades with additional throw-back re-mixing blades. A spider drum drive with a flexible sleeve in the front trunnion is said to insure permanent self-alignment. The entire transmission is mounted as one unit with the engine, clutch, automatic brake, 2-speed gear box, and enclosed final gear reduction on one frame. The whole assembly may quickly be removed as a unit. Fluid drive, in place of standard clutch, is also available.

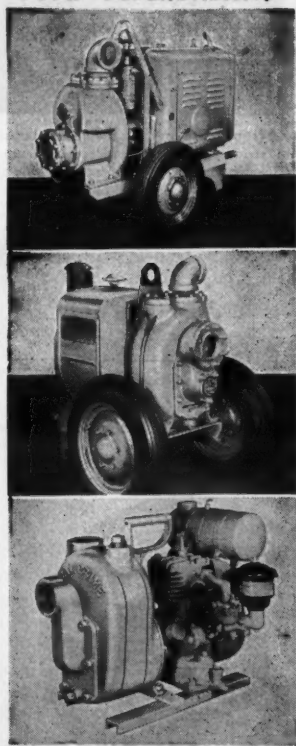
Continuous self-lubrication of the hopper seal is provided from a built-in grease reservoir of 5-pound capacity, which is refilled periodically by an attached high pressure grease gun. The seal, Jaeger says, is leakproof and long-wearing and can be replaced in 30 minutes without removing the hopper.

Further information on the Payloader line may be secured from the company. Or use the Request Card at page 16. Circle No. 4.

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Improved Power Barrow

A hydraulic lift attachment for the Moto-Bug has been designed by the Kwik-Mix Co., of Port Washington, Wis., according to a new catalog recently released by the company. The manually operated hydraulic pump lifts a capacity load of 500 pounds. Photographs in the bulletin illustrate this development and others made on the Moto-Bug, including a large steering wheel and a 5-foot scraper blade or snow-plow attachment. All front-end attachments can be easily interchanged.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 78.

Mack Steps Up Nickerson

F. S. Nickerson has been elected Vice President of Mack-International Motor Truck Corp. of New York City and Manager of the company's Central Division Sales territory. He was formerly Manager of the Baltimore branch.

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Toll Roads Assailed, Defended in Debate

"Pros" Justify Tolls as the Means to Provide Needed Roads Now; "Antis" Decry Them as Harmful to Overall Program: Alternative Suggested

IN a recent debate, the toll method of financing highways was assailed, on the one hand, as undemocratic and economically unsound; and defended, on the other hand, as a quick means of getting modern highways. The debate was a feature of the Highway Transportation Congress sponsored by the National Highway Users Conference.

R. E. Jorgensen, Deputy Commissioner and Chief Engineer of the Connecticut State Highway Department, and E. Carroll Bean of Augusta, Maine, former master of the Maine State Grange, upheld the affirmative side of the question—Resolved: that the toll method of financing highways is unsound. On the negative side were Col. E. R. Needles of New York, President of the American Road Builders' Association, and W. B. Getchell, Jr., Executive Director of the Maine Turnpike Authority. G. A. Vahlkamp, Secretary and General Counsel of the Automobile Club of Missouri, St. Louis, was the moderator.

Alternative for Tolls

"As a highway engineer," said Mr. Jorgensen, "I see toll roads as heading us for trouble. A great enthusiasm for toll financing has developed from a number of misconceptions about toll roads," he said, warning that the "result may well be the development of a relatively small number of toll roads to the great disadvantage of the total road program."

He acknowledged only one argument for toll financing as worthy of thoughtful consideration: "The contention that there is no practical alternative . . . if we are to have high-standard facilities now, rather than 20, 30, or more years from now."

Mr. Jorgensen suggested as a practical alternative that public expressways, free of tolls, be built through the issuance of bonds, in the same way that toll-financed highways are being built. "Since bond financing has been successful on a toll basis," he declared, "it is

even sounder for the same kind of facilities on a toll-free basis, where the overhead costs associated with toll collections are eliminated and where the credit situation may well provide a much lower interest rate on bonds.

"With bond financing, we could proceed rapidly to develop the relatively small mileage of the most important routes, which have been shown by all studies to be such critical elements in the total motor transportation picture but which, because of their character, require large initial expenditures for their construction. The job should be done on a system-wide basis, not road by road as the toll roads are developing. . . . This bond financing of toll-free highways should be backed by the credit of the state and by highway-user revenue."

Questions Soundness of Tolls

Mr. Bean held that the toll principle of highway financing "has yet to prove that it is economically sound—in good times and in bad. . . . Toll roads scat-

tered around the country in necessarily hit-or-miss fashion are bound to have damaging effect on the systematic development of public highways," he said, "and will also hamstring needed improvement of paralleling public roads which must continue to serve most of the traffic."

Mr. Bean analyzed the financial results of the first two years' operation of the Maine Turnpike, the 44-mile expressway from Kittery to Portland, and declared that this toll highway "is rapidly going 'broke'". He cited the original cost, financed by bonds, of \$20,600,000, and said annual interest amounts to about \$529,000; operating costs are in excess of \$228,000; and payments on the principal, if it is to be repaid within a 30-year period ending in 1976, would average \$686,666.

"Without earmarking any current revenue for eventual reconstruction," said Mr. Bean, "it appears that this toll road, to be completely self-liquidating as of today, must take in total annual revenue in excess of \$1,443,000." Actu-

ally, he said, official figures show the road's total revenue for the calendar year 1949 amounted to \$871,654—or \$572,000 less than would be necessary to pay one-thirtieth of the principal, plus current interest and operating costs."

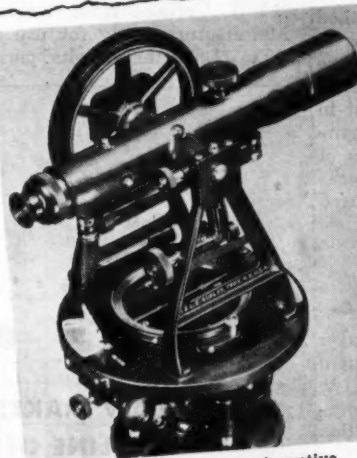
Better Highways Needed

Col. Needles told the group that "our state highways are breaking down and are not being replaced . . . traffic jams miles in length are not unusual. These are symptoms of the creeping paralysis from which all America is suffering." He said that funds for state highway construction are woefully inadequate. And there are very few cases where these funds are being increased by the sale of general obligation bonds, he added, since most state authorities consider it unwise to present bond issues to the voters for approval at this time. This situation, he declared, is what has led to the use of the toll method of financing roads. "As always, the

(Concluded on next page)

LEADING TECHNICAL PUBLICATION ANALYZES WHY GURLEY ALUMINUM TRANSITS ARE ACCURATE, STRONG, LIGHT, VIBRATION-FREE

The full-length article from which this is reproduced appeared in MODERN METALS. Reprints are available on request.



Gurley Instruments

An article describing the advantages of aluminum construction of Gurley instruments where accuracy, strength, lightness and freedom from vibration are essential.

Probably the controlling incentive in the application of aluminum alloys to surveying instrument construction has been the prospect of weight reduction. Consider the labor to be saved by a surveying party which has to carry these instruments about, day after day, often over rough country, when the weight can be reduced by at least one-third.

A comparison of the mechanical properties of the aluminum alloys with those of the other non-ferrous alloys commonly used in the making of surveying instruments is greatly in favor of the light weight metal. The remarkable feature of these strong aluminum alloys is their high yield point in relation to their ultimate strength, especially those in the fully heat treated condition. They are also very rigid and hard.

Some aluminum alloys are suitable for die-casting. Special bearing metals can be inserted in the molds and cast integral with the structural parts. In no other way have bearing

metals and structural metals been so effectively and economically combined. A further result of the use of aluminum alloys through this method of manufacture is a decrease in the number of parts. Minor assemblies have been combined into single parts, permitting more accurate manufacture and insuring a permanence of adjustment of these parts in service. The latter feature is doubly true, since the aluminum alloys differ from other materials of instrument construction in that they do not "grow" nor distort with age.

The non-corrosive and non-tarnishing qualities of aluminum furnish added inducements to their application in the construction of precision instruments. This has led to their substitution for silver on accurately graduated circles and verniers. Burnished aluminum does not blacken when in contact with sulfurous gases frequently found in the atmosphere of mines and industrial districts.

Tests with transits made from

aluminum alloys have shown, not only greater structural strength and durability, but greater stability under conditions which induce vibration. That this should be so is readily apparent, since the light weight greatly reduces the momentum of the instrument and consequently the amplitude of vibration.

Gurley transits constructed of the light alloy metals have been used on all kinds of work, meeting successfully the requirements of durability where Transits receive exceedingly rough handling; permanence of adjustment where they are transported over rough roads; a high degree of accuracy where the work is such as to require especially fine graduations; and economy where serious accidents occur which necessitate repairs. Taken all together Gurley's experience with aluminum, covering a period of over 74 years, has been entirely satisfactory and their use of these modern materials is becoming more and more appreciated by the field engineers.

Gurley Transits are guaranteed because: they are engineered and manufactured to exacting standards; all parts are made in the Gurley plant (including all optical components); they are the products of continuous instrument research for more than 104 years.

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Toll Roads Assailed, Defended in Debate

(Continued from preceding page)

public must pay. The toll is simply a special form of taxation. . . ." He cited the New Jersey Turnpike as an example of the "soundness" of toll road legislation.

"We may theorize on the best forms of taxation," Col. Needles concluded, "but if we want to build highways which are costly but very necessary, we must be practical in our ideas on finance." The public is willing to foot the bill for toll roads, he said.

Toll-Road Financing IS Sound

Replying to Mr. Bean's assertion that the Maine Turnpike was "going broke", Mr. Getchell admitted that none of the principal of the \$20,600,000 bond issue has been repaid as yet, but said it was planned to repay \$80,000 of the principal this year and \$160,000 next year—and so on, on a graduated scale geared to an expected increase in use of 4 per cent a year covering the period of the next 25 years.

"Our modern toll highways have pioneered a new hope for breaking critical bottlenecks," he said, "and have demonstrated their possibilities as a valuable supplement to our highway system."

Chain Saw Handbook

A new 36-page handbook on power-driven chain saws has recently been issued by Henry Disston & Sons, Inc., Tacony 231, Philadelphia 35, Pa. The book takes up maintenance problems, specific uses, specifications, and capacities, each in turn in a step-by-step presentation. It explains the operation for starting and stopping the engine, proper oil and gas mixtures, how to notch and fell different species of trees, and applications in construction. A special section is devoted to service information and preventive maintenance of the equipment.

Planned as a primer, illustrated guide, and sales manual on chain saws, the booklet covers the entire Disston line: the one-man bow saw, the 3.5-hp 18 to 30-inch straight-rail types, and the 12-hp two-man chain saw.

This literature may be obtained from the company, or by using the Request Card which is bound in at page 16. Circle No. 21.



The Scooter Model Hydrauger, a 150-pound earth-boring machine, digs 2 or 2½-inch holes. An air-driven cable winch pulls the machine along on its sled mount.

Earth-Boring Tool

A new 8-inch-wide 150-pound machine known as the Scooter Model Hydrauger has been designed by the Hydrauger Corp., Ltd., 681 Market St., San Francisco, Calif. It features a full-length sled mount and an air-driven cable winch that pulls the entire machine along as it advances the boring bit into the ground. The Hydrauger is used principally for utility service leads and boring holes through embankments.

Up to 70 feet of drill stem can be laid out ahead of the machine and pulled into the earth formation by means of the winch and cable. The tool can bore 2 or 2½-inch holes, and it is operated by both air and water. It has a built-in pressure water pump for 110-psi non-clogging water circulation. Motors of 3.2 or 5.1 hp are available.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 71.

Sales Mgr. for Wellpoint Co.

William Okos is now Sales Manager of Complete Machinery & Equipment Co., Inc., Long Island City, N. Y. In this position he will handle the company's wellpoint equipment distribution on a nation-wide basis. Mr. Okos was formerly Field Engineer for the Gates Rubber Co., Denver, Colo.

Public Relations in Virginia

The Virginia Department of Highways recently held a 2-day session on relations with the press and public. Engineers from the Department's main office, the entire corps of district engineers, resident engineers, right-of-way agents, survey-party chiefs, and equipment superintendents attended.

Augustus Robbins, Editor of the *Hopewell (Va.) News*, and twice President of the Virginia Press Association, spoke at the session. He urged engineers to become better acquainted with local editors in their sections, for local papers can sell the Department on a community level.

Robert Nelson, Managing Director of the Virginia Travel Council, outlined Virginia's program of increasing tourist revenue. He said that the highway engineer and the maintenance and construction forces played important roles in attracting and keeping tourist trade.

The Department's public relations personnel stressed the good will created on a day-to-day level by pleasant telephone manners and prompt attention to correspondence and visitors.

The conference hammered home the point that public relations is the responsibility of the entire Department, not alone of the public relations officer.

Cap Tension Bolts

A circular describing emergency cap tension bolts, designed to eliminate long equipment lay-ups caused by broken tension bolts, has recently been prepared by the Silver Booster Mfg. Co., 132 W. Verdugo Road, Burbank, Calif. Manufactured only for use on Caterpillar D8's, these bolts permit a 30-

minute installation when a track tension bolt breaks. The literature explains the features of the bolt and illustrates the simple method of installation.

This literature may be obtained from the company, or by using the Request Card which is bound in at page 16. Circle No. 109.

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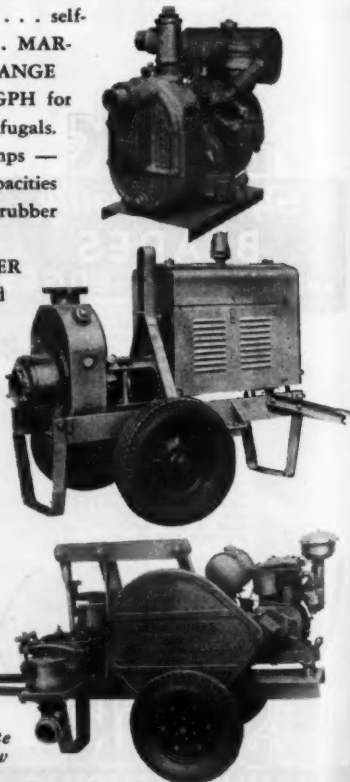
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16 West Johnson Street
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Concrete Lock Built On 1,164 Wood Piles

**Driving and Concrete Work
Done From Trestle; Hole for
Bayou Teche Lock Kept Dry
With Wellpoints**

By WILLIAM H. QUIRK,
Eastern Editor

LONG delayed by World War II, Berwick Lock in southern Louisiana is now being completed to serve navigation from the Lower Atchafalaya River into Berwick Bay, and thence into the Atchafalaya River. The New Orleans District, Corps of Engineers, project got under way back in July, 1941, but was shut down in August, 1942, when materials could no longer be obtained for the rest of the job. Work was resumed in November, 1948, under a completion construction contract that was finished in March, 1950.

The lock is located on the west side of Berwick Bay in St. Mary Parish, 2 miles north of Berwick, La. It runs north and south, having a usable area of lock chamber 300 feet long x 45 feet wide, with a maximum lift of 15 feet and a minimum 9-foot depth over the sills. At the ends of the lock chamber are the north and south gate recess blocks, and beyond them the north and south approach blocks. The gate recess blocks are 61 feet long and the approach blocks 50 feet, giving the structure a total length of 496 feet.

With the completion of the lock, the present mouth of Lower Atchafalaya River just north of the structure will be closed off by a levee that will become part of the West Atchafalaya Basin Protection Levee. This levee will tie into the south gate of the lock, and continue southward along the west bank of Berwick Bay to tie in to the new concrete floodwall in Berwick.

New Lock

The reinforced-concrete lock is supported on untreated-timber foundation piles, and so designed that the average load per pile is 15 tons for the maximum loading condition. Pile spacing varies up to a maximum of 4-foot 8-inch centers, with the average around 3½-foot centers both ways. The piles are cut off so as to project 6 inches into a 12-inch plain-concrete stabilization slab laid over the area of the structure. In the lock chamber, a floor slab 4½ feet thick was poured on top of the stabilization slab. In the gate blocks outside the chamber the concrete slabs are 5½ feet thick. These slabs are reinforced, as are the concrete walls.

Natural ground elevation at the lock site slopes upward slightly from 4.0 at the south end to 6.0 at the north. Elevations are referred to Mean Gulf Level. The level of the Lower Atchafalaya River at its confluence with Berwick Bay varies considerably, but normally is around 2.0. The lock floor is at minus 9.8 elevation. The walls are over 27 feet high, having a top elevation of 17.5. At the bottom they are

4 feet 5 inches thick, and are vertical on the inside. The outside face batters in from the base to an 18-inch width at elevation 7.7, and maintains that width to the top.

Slab reinforcing consists of two layers of steel rods at the bottom and a single layer at the top. Both sides of the walls are reinforced. At each end of the lock chamber there is a set of sector gates. The lock is divided into nine monoliths numbered from north to south. The north approach block is 1; the north gate recess block is 2; the chamber includes 3, 4, 5, 6, and 7; while 8 and 9 are the south gate recess and approach blocks respectively. At each end of the structure there is a steel-sheet-pile cut-off wall driven to elevation minus 34.5.



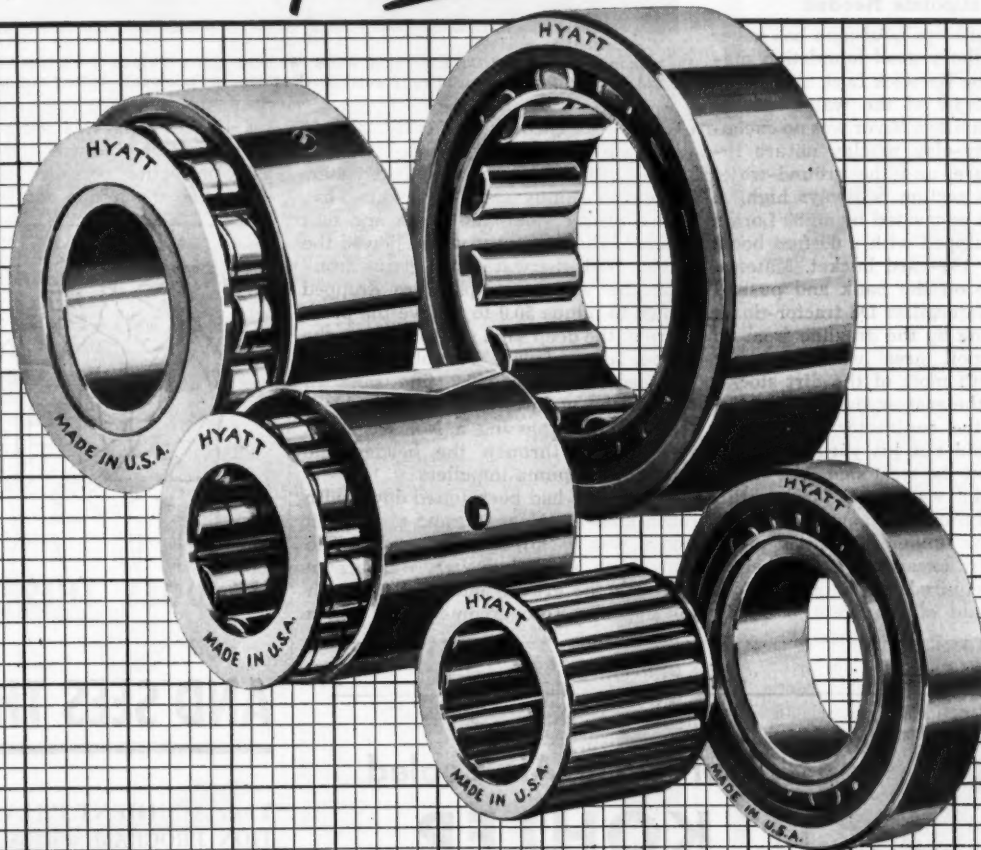
New Orleans District, Corps of Engineers, Photo

A gantry crane working from a timber trestle drives wood foundation piles for the Berwick Lock. The steel-sheet-pile retaining wall and a portion of the base slab were built under a previous contract.

Originally a Flood Gate
Originally the Berwick Lock was

planned to be simply a flood gate, at
(Continued on next page)

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HYATT ROLLER BEARINGS

Concrete Lock Built On 1,164 Wood Piles

(Continued from preceding page)

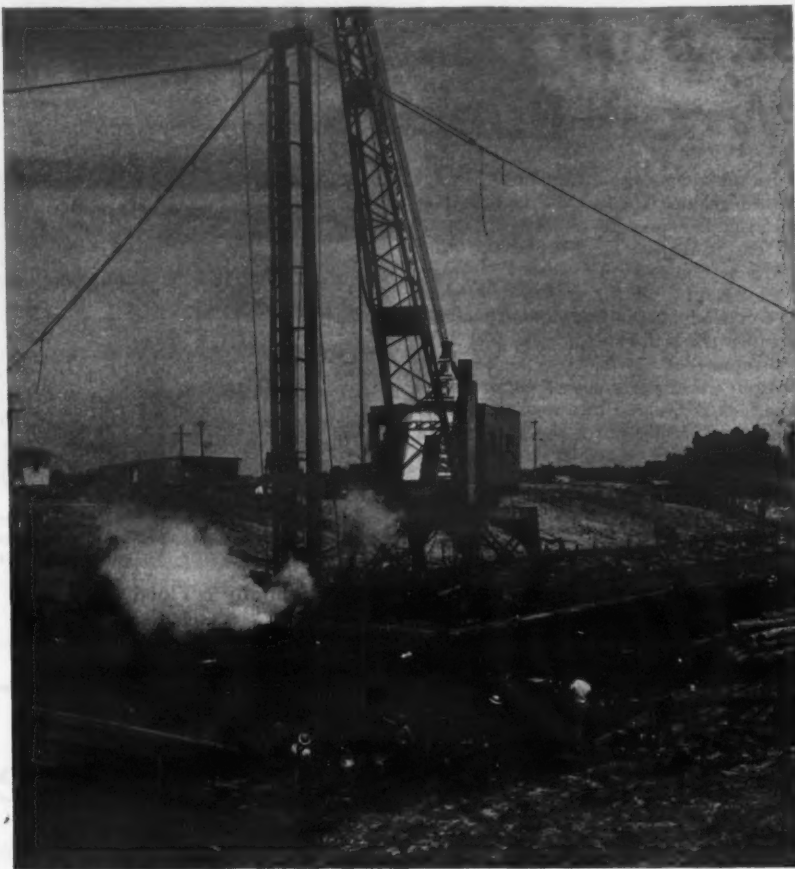
what is now the north end of the structure and extending the length of only the first three monoliths. Under a pre-war contract, this phase of the work was awarded to the Norman Construction Co. of Lake Charles, La. When work was suspended in 1942, the necessary excavation had been made, timber piles driven, and concrete slabs poured for three monoliths; the initial steel reinforcing for the walls was in place; and sheet-pile cut-off walls were driven at both ends of the structure.

The post-war contract, awarded by the New Orleans District, Corps of Engineers, to the Maxon Construction Co., Inc., of Dayton, Ohio, on a low bid of \$923,987 covered the completion of construction, utilizing what had been done as a gate in building an entire lock. The only major part of the original construction that could not be used was the row of steel sheeting that had been driven at what was to have been the south end of the flood gate. This piling wall was removed for the construction of the additional monoliths forming a lock. A new steel wall was driven at the south end of the extended structure.

Wellpoints Needed

Soil in southern Louisiana has never been particularly good foundation material, and the Berwick Lock site within a stone's throw of the waters of the Lower Atchafalaya River was no exception. Its silty-clay to clay nature retains moisture, and the ground-water level in this section is always high. A big hole was excavated by an 80 Lorain dragline equipped with a 60-foot boom and a Page 1½-yard bucket. Material was cast up on the bank and pushed back by a Caterpillar D8 tractor-dozor for rehandling by the dragline from on top. The spoil area was somewhat cramped, with most of the dirt stockpiled along the east or river side of the lock, since the contractor put up his shops and laid out his yard and concrete plant on the west side. The excavated material was saved for backfill.

Because of the ground swell expected in driving the timber foundation piles, the contractor excavated 2 feet below the grade required, or to minus 16.0 elevation. Side slopes were 3 to 1.



C. & E. M. Photo

Maxon Construction Co. used this Wiley Whirley and a Vulcan No. 1 hammer to drive the timber foundation piles for Berwick Lock. A Brownell boiler supplied steam.

Water was encountered early, and 66 separate Moretrench wellpoint risers were installed with their tips going down to minus 28.0 elevation. They were placed along the north and east sides of the hole, past which flowed the river. With the water still giving trouble, the wellpoint tips were dropped down to minus 50.0 to relieve the pressure in the deep sand stratum below the upper layers of clay. Trouble was experienced with the very fine sand in which the wellpoints were embedded; the material, passing a No. 200 sieve, was drawn through the header line and cut the pump impellers.

The risers had been jetted down with an 8-inch-diameter jet, and the hole it made was backfilled with gravel. The extra-fine sand, however, was drawn through the gravel and also the mesh on the riser. To overcome this, a 6-inch

jet 45 feet long was used. The lower 6 to 7 feet of pipe was filled with sand as a protecting core around the riser. Thus the sharp fine sand that pene-

trated the gravel could not get through the other sand to damage the pump. Water was also siphoned in from the river so as to maintain vacuum on the pumps when the risers were in the sand stratum.

The 10-inch header pipe was laid around the side slopes on a timber trestle at elevation minus 8.0, and the water table was lowered and held at minus 16.0. In addition to the American 10-inch pump on the header line, the hole was unwatered with the help of two LaBour 4-inch pumps, one Worthington 4-inch pump, one Westco 3-inch pump, a Nash Hytor vacuum pump, and a Fairbanks-Morse pump.

Timber Pile Foundation

A total of 1,164 timber piles were driven under this contract as a foundation for the lock. They are long-leaf yellow-pine piles, averaging 41 feet in length, with 9-inch tips and 14-inch butts. The piles were obtained from the forests around Fluker, La., and trucked 90 miles to the job site. They were driven into a solid sand stratum approximately 30 feet thick. At the north end of the site the top of the sand was around minus 32.0 elevation, while at the south end it dropped off to about minus 40.0. Pile penetration covered nearly their entire length, and the minimum number of blows to the foot with the hammer was 30.

Driving was done with a Vulcan No. 1 hammer handled by a Model 75-14 Wiley Whirley gantry crane equipped with an 85-foot live boom. Steam for the full 36-inch stroke of the hammer was provided by a Brownell 60-hp oil-burning boiler, a part of the rig. The machine picked up the

(Continued on next page)



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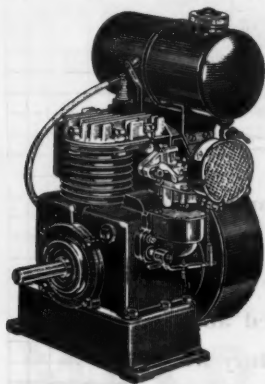
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piles and set them in 60-foot steel and wood swinging leads. The tops of the leads were guyed three ways to dead-men buried in the sides of the cut. No jetting was used in driving.

A template was laid out for a driving guide. It consisted of a pair of 12 x 12's, laid transversely on the cut and staked in position about 12 feet apart. On top of these timbers another pair of 12 x 12's was placed longitudinally, just far enough apart to admit a pile. After piles were driven through the guide slot, it was moved over the transverse timbers to the next row of piles. As the leads followed along, adjustments in the guy lines were made to suit the new position. Cable was let out or the slack taken up by hand lines. All the controls were handled from the ground so that a man didn't have to climb the leads.

Work Trestle

The gantry operated from a timber work trestle which was constructed over the piles down the center of the lock. As the piles were driven they were cut off to grade with hand saws. Pony bents, about 4 feet high, were then built up from the piles on 16 to 18-foot centers. The piles at the center of these rows were capped with concrete blocks, 20 inches square x 6 inches deep, with their tops the same grade as the stabilization slab. Vertical timber posts were then set on top of the concrete blocks. These uprights supported transverse timber caps. A pair of 15-inch I-beams were laid on top of the caps as stringers at each side of the trestle. The stringers, in turn, supported 6 x 8 ties on 24-inch centers.

To these ties 80-pound rails were spiked on 18-foot centers, the gage of the gantry wheels. Ties and rails were also laid over the concrete monoliths completed in the prior contract, thus permitting the crane to travel the entire length of the lock. While the excavation was in progress, the Whirley pulled some dolphins which had been driven during the previous work, and also the sheet-pile wing wall from the south end of what was to have been just a flood gate. A Vulcan 800-A pile extractor removed the steel sheeting. The new cut-off wall at the south end of the extended structure was built with I-22 sections, 14 to 42 feet long, furnished by the Inland Steel Co. of Chicago. They were driven with a Vulcan No. 2 hammer.

An average of 25 timber foundation piles were driven from the work trestle in an 8 to 10-hour day. The high for any single day was 42 piles. The trestle was also used in constructing the stabilization slab and floor slab. As this floor slab was poured, the pony bents were dismantled. Ties and tracks were laid on the concrete so that the gantry could still be used on the floor slab and wall construction. Planks were laid on the ties between the rails to form a roadway for the trucks hauling the concrete.

Concrete Operations

A concrete-mixing plant was set up on the north end of the lock site. It consisted of two Erie Strayer 1-yard portable mixing plants erected on separate platforms. Between the mixers was a 2-yard hopper into which concrete was discharged. The hopper was also on a platform, high enough to permit trucks each with two 1½-cubic-yard Blaw-Knox buckets to back under for loading. Two of these trucks sufficed to haul the mixed concrete the short distance out the trestle to the gantry. There the buckets were swung over the forms by the Wiley Whirley.

Construction materials came in by rail to the Southern Pacific Railway siding at Berwick; from there they were hauled in trucks 2 miles to the job site. Lone Star air-entrained cement came from New Orleans in bags. The Hollaway Sand & Gravel Co. of Baton Rouge,

La., supplied the aggregate. Bag limestone, used to make up the deficiency of fines in the sand, was supplied by the National Cement Co. of Birmingham, Ala. Reinforcing steel was furnished by the Truscon Steel Co. of Gadsden, Ala. The Lorain crane unloaded materials, stockpiled the aggregate, and charged the mixing plants.

The first concrete pour was made the latter part of May, 1949. Wooden forms were used, secured with Richmond Tyscrus. Absorptive form lining was employed on the wall pours. The concrete was cured with water. With this set-up of two 1-yard mixers and two trucks for hauling, concrete was placed at the rate of 50 yards an hour.

Forms were prefabricated as much as possible in the carpenter shop, which was equipped with a DeWalt circular saw and three Black & Decker portable saws.

Power and light was supplied to the job site by the Gulf Public Service Co. The 2,300-volt line was stepped down

(Concluded on next page)

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Concrete Lock Built On 1,164 Wood Piles

(Continued from preceding page)

through transformers to 110 and 220-volt circuits. The power lines ran the various electric pumps and the tools used in the carpenter and machine shops.

Quantities and Personnel

The two sets of sector gates were supplied and erected by the Consolidated Steel Corp. of Orange, Texas, while the Mobile Pulley & Machine Works of Mobile, Ala., furnished the operating machinery.

The major items in the Maxon Construction Co. contract included the following:

Structure excavation	31,000 cu. yds.
Backfill	40,000 cu. yds.
Foundation piles	46,560 lin. ft.
Steel sheet piling	2,000 sq. ft.
Pulling and redriving steel sheet piling	4,200 sq. ft.
Concrete stabilization slab	714 cu. yds.
Concrete floor slab	2,880 cu. yds.
Concrete walls	2,990 cu. yds.
Portland cement	9,000 bbls.
Steel reinforcing	1,068,000 lbs.
Absorptive form lining	36,000 sq. ft.

At the peak of operations the Maxon Construction Co. employed a force of 90 men under the direction of W. R. Pierson, Superintendent, with John Skillman as Assistant Superintendent. Ira Adams was Office Manager.

The Corps of Engineers was represented by John O'Bryan, Project Engineer, with Andrew H. Davis as Chief Inspector. The Berwick Lock project was under the supervision of Henry K. Lee, Field Assistant, with headquarters at Morgan City, La. The New Orleans District, Corps of Engineers, is headed by Col. Charles G. Holle.

A 5-Inch Slide Rule That Has 22 Scales

A new 5-inch pocket-size log log all-metal slide rule, bearing the identical scales of its larger 10-inch counterpart, is announced by Pickett & Eckel, Inc., 5 S. Wabash Ave., Chicago 3, Ill.

This new pocket rule incorporates the following features: 22 scales, with a back-to-back arrangement which brings related scales together and gives the appearance of a simple 12-scale rule; a combination of C-D scales on both sides; a dimensionally stable all-metal body, with optical tongues and grooves machined to 0.001-inch accuracy; and telescopic adjustment screws for re-

alignment. An instruction manual and a full leather pocket case are provided with each rule.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 108.

New Hand Grease Gun

A new grease gun which can be operated with one hand has been announced by the K-P Mfg. Co., 1226 Linden Ave., Minneapolis 3, Minn. Called the Red Cap, it has a 6-ounce capacity, is of all-steel construction, and is said to develop ample working pressure for all normal greasing needs.

A compression cylinder operates in conjunction with a grease plunger rod and forces the lubricant into the rear of the gun barrel, compressing and ejecting the grease simultaneously. A hydraulic coupler may be added if desired.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 70.

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AD-4 MOTOR GRADER

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Each pier required about 60 yards of excavation, and the pouring of about 30 yards of concrete, and the center structure approximately the same. Our Lima did both jobs - excavating and pouring one pier each construction day. Excavation from the third pier provided backfill for the first, the fourth for the second, etc. Even though the machine was waiting much of the time, a definite labor saving was made in handling the concrete - because ground conditions would have made long ramps necessary for getting it to the piers in any other way. We used a 36 foot boom and while the machine could easily have handled 3/4 yard buckets, we used 1/2 yard clamshell and concrete buckets which were the only ones available at the time.

We have had this Lima since January 1948, and since then it has been in continuous service. We use it for a wide range of duties including trenching with a pull shovel attachment for water and sewer mains, excavating sewage lift stations and disposal plants, etc. We have had no breakdowns of any sort, and maintenance costs are remarkably low. We are more than satisfied with this Lima. It is the first we ever owned, but we do not expect it to be the last.

Yours very truly,
PHELPS-DRAKE CO., INC.
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Texas Reorganizes Highway Department

Top-Level Changes Made to Relieve Chief Engineer of Details, Speed Business, Streamline Department

BY adding to its top-level staff, the Texas Highway Department has brought about the first major change in its organization since politics disappeared more than two decades ago. Designed to relieve the State Highway Engineer of details, the new changes were effective February 1. They are expected to make the Department operate faster and more efficiently.

The change adds six men to the hot seat formerly occupied only by State Highway Engineer D. C. Greer. Patterned somewhat after the California Division of Highways set-up, there is now a Deputy State Highway Engineer with full authority to function as State Highway Engineer.

Other new additions include two Assistant State Highway Engineers, who are detached from the normal chain of command. Three new Chief Engineers have been added. Their duty is to correlate work of the 4 to 6 divisions under their supervision.

Responsibility and authority of division heads and district engineers is not affected. They function as they did before, with the exception that they take up their problems with the new men in the chain of command.

For the State's Good

State Highway Engineer D. C. Greer pointed out that Texas has grown from a \$40,000,000 budget and 18,000 miles of roads to a \$100,000,000 budget and 39,000 miles of highways. During that period the old system had not been changed, and bothersome details which came to the Chief Engineer's office were staggering.

Greer believes that everybody in Texas who wishes to see him is entitled to a hearing, but under the circumstances, he was often unable to accommodate them. From the standpoint of public relations and highway-department representation at public functions alone, more top-level people were needed to represent the highway engineer's office.

George M. Garrett, former District Engineer at Fort Worth, is the new Deputy State Highway Engineer. Frank S. Maddox and Thomas C. Collier are the new Assistant State Highway Engineers. Chief Engineers include Herbert Eldridge, Planning; John A. Waller, Construction and Maintenance; and R. J. Hank, Operations.

The new system is already showing its better points. Highway-department representation has improved. There are enough top-level people now to give

their time to personnel, programming, and commission hearings. Many matters which formerly came up through the divisions to Greer now are handled by the Chief Engineers.

A recent highway-department policy of full retirement or modified service at age 65 influenced to a large extent the selection of the new personnel. All are men who have from 12 to 15 years of service ahead of them before they think of retirement. All are men with years of service in the Texas Highway Department.

It is expected that the addition of the six new posts will save the people of Texas untold thousands of dollars in increased efficiency, and give the State Highway Engineer time to grapple with still-numerous problems of large magnitude inherent in any \$100,000,000 annual highway-building outlay.

Maintenance Trestles

A new 8-page catalog illustrating a complete line of maintenance trestles.

has recently been issued by Bil-Jax, Inc., Archbold, Ohio, manufacturer of tubular steel scaffolding and equipment. Adaptable to many types of maintenance work, the trestles may be used for painting, repairing, building, wall washing, and other off-the-ground

duties. The catalog gives complete specifications of the height and length variations possible, plus full details on accessories.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 32.

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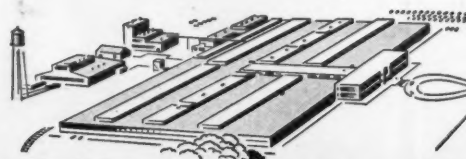
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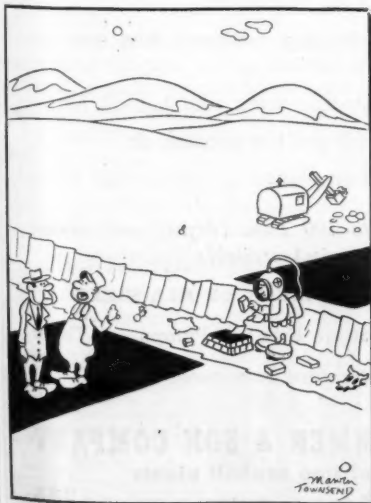
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"I dunno; it has something to do with union rules."

Concrete Apron Laid On Granular Sub-Base

Improvements at Airport Also
Include Auto Parking Area
And Administration Building

(Photo on page 1)

STANDIFORD Field, the municipal airport for Louisville, Ky., has just undergone major improvements that include the construction of a new administration building, and the grading, draining, and paving of an apron and auto parking area. The new construction was sponsored jointly by the city of Louisville and Jefferson County Air Board, together with the Civil Aeronautics Administration, at a total cost of \$917,412.91. The two principal contracts covering the work were completed this spring.

Standiford Field is located about 5 miles southeast of downtown Louisville, and is reached over Preston Highway, State Route 61, running east of the field. To the west are the tracks of the Louisville & Nashville Railroad. The average elevation of the airport is 480. The new brick administration building, with control tower on top, is at the north side of the airport. It replaces a small, temporary frame structure at the opposite side of the field. To the rear, or north of the new building, is the auto parking area, while the apron is in front or on the south side. Beyond the apron is the main taxiway, and then come the runways.

Measured on the arc, the administration building is approximately 410 feet long x 46 feet wide, with a 33 x 46-foot cargo building at the east end of the administration building connected by a 17-foot covered concourse. It was designed by Nevin & Morgan, Architects, and constructed by Sullivan & Cozart, building contractor, both of Louisville, at a cost of \$676,270. The minimum distance from the building out to the taxiway is 300 feet.

Airport Apron

The field contract for the apron and auto parking area was awarded to the Breslin Construction Co. of Louisville on its low bid of \$240,035.71. Grading got under way last September, and by the end of 1949 the major portion of the project was completed, with paving of the auto parking area, access road, and completion of apron paving left for the early spring. The apron is approximately 900 x 300 feet, and is built with a granular sub-base supporting the plain-concrete slabs.

Flaring out from the administration building on a 60-degree angle, and built into the apron, are two walks 20 feet wide x 290 feet long. The concrete in these sidewalks, which are for the use of passengers and airport personnel, is 4½ inches thick. Along the sides of the walks are flanking strips of medium-depth pavement, 6½ inches thick and 50 feet wide x about 315 feet long. Over such areas operate the trucks servicing the planes. The pavement for the rest of the apron is 10 inches thick over the plane standing areas. The greater depth of concrete is needed where the planes load and warm up prior to their take-off.

The apron will accommodate 12 planes—three on each side of the two walks. The plane standing areas include 10 circles of 158-foot diameter, and 2 circles of 125-foot diameter for the 12-plane-capacity apron. The circles clear the walks completely. Embedded in the concrete are ¾ x 24-inch tie-down anchors. At their centers a 4½-inch-long depression was trowelled in the concrete so that a line from a plane can be secured to the anchored rod. Interior drainage of the apron was

effected with a series of drop inlets and catch basins.

Grading and Sub-Base

Both the apron and parking-lot sites were somewhat lower than the rest of the field, and the ground was of a swampy nature. Ground water was close to the surface and some muck was removed over these areas, then they were backfilled with desirable material. The excavation was handled by a couple of LeTourneau Carryalls pulled by a Caterpillar and an International tractor. Material for the backfill came from a borrow pit 1½ miles from the site. It was dug out by a Lima ¾-yard shovel and hauled to the field in a fleet of 8 trucks holding about 6 yards each.



C. & E. M. Photo

An International TD-18 pulls two sets of dual sheepfoot rollers over the parking-lot fill at Standiford Field. The front set is filled with water, the Heil rear set is weighted with sand in order to get better compaction.

The fill was spread in 3-inch lifts by a Rome motor grader, and compacted to 95 per cent maximum density over the apron and to 90 per cent maximum density over the parking area. Both sheepfoot and rubber-tire rollers were used in the compacting. The former type consisted of an International TD-18 pulling two sets of dual sheepfoot

rollers—the front set filled with water, and the Heil rear set weighted with sand to get better compaction. The rubber-tire unit was made up of an Oliver 88 industrial rubber-tired tractor pulling a Bros roller weighted down with sand and a large chunk of concrete.

A 4-inch granular sub-base was laid (Concluded on next page)

HEAVY-DUTY TRENCHER

A heavy-duty trench digger, which is designed for a wide variety of trenching for any highlift tractor with hydraulic bucket control.

It will increase the tractor's production from 30 to 50 per cent, and is easily attached by one man in 15 minutes.

The Whitestown Trencher is equipped with a ½-yard standard bucket. Special buckets, made to individual specifications, may be obtained. It will dig to a depth of 8 feet and dump at a height of 12 feet. This trencher has been in constant use for three



The Whitestown Trencher is now available for use on the following hydraulic controlled tractors:

Allis-Chalmers HD-5G equipped with TS-5 Tractor-Shovel Caterpillar D-4 and Trackson HT-4

International TD-6 & TD-9 equipped with new Bucyrus-Erie dozer-shovel.

years, and has proved to be rugged and satisfactory in every way.

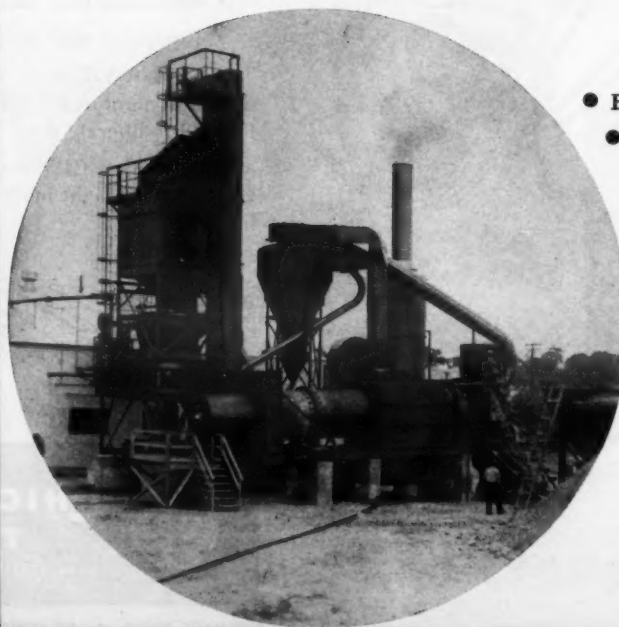
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over those areas of the apron taking the thick 10-inch paving. It consisted of a layer of No. 6 limestone, graded from 1/2 inch down, laid by an Apco spreader, and chinked with limestone dust fines. The stone and dust were supplied by the Louisville Crushed Stone Co. and delivered to the airport in trucks. The dust fines were worked into the stone base by rolling with a Buffalo-Springfield 3-wheel 10 to 12-ton roller, trailing a drag broom. The sub-base was put down in strips 29 feet wide. On top of this the concrete pavement was laid in 25-foot lanes. The 2 feet additional on each side afforded the needed space for the road forms to be anchored properly.

Concrete Paving

The concrete paving was done by F. A. Schultz Concrete Construction, a Louisville subcontractor, using ready-mix concrete supplied by the Louisville Concrete Supply Co. It was delivered to the job in a fleet of up to 15 transit-mixers holding from 3 to 6 cubic yards each. Jaeger road forms totaling 2,000 linear feet were employed by the contractor, who set them by hand to form 25-foot slabs. Alternate lanes were poured, the concrete being placed at the average rate of 250 yards per 10-hour day.

Contraction joints were spaced 20 feet on centers, and consisted of Superior basket-type assemblies supporting 1 x 16-inch dowels on 12-inch centers. The adjoining lanes were tied together by a keyway built into the sides of the forms, and the longitudinal dummy groove joint at the center of each paving lane was tied together with tie bars, 5/8 x 30-inch, on 30-inch centers. Both transverse and longitudinal joints between the slabs were cut out to a depth of 2 1/2 inches, 3/8 inch at the top, 1/4 inch at the bottom, and with a 1/4-inch radius for the edging. Expansion joints were used only when the new construction met concrete already in place, and in front of the administration building where paving lanes met at an angle.

As the concrete was deposited between the forms, it was struck off and leveled by a Jaeger-Lakewood dual-screed finishing machine, and bull-floated along the longitudinal axis by hand. The surface was checked by long-handle straight-edges, and smoothed over with a 24-inch canvas belt. It was then broomed and cured with burlap kept saturated for the required curing period.

Auto Parking Area

The auto parking area has a bituminous-macadam pavement 6 inches thick. First a 1-inch insulation course of stone dust was laid at the rate of 90 pounds to the square yard. On top of this went two 2 1/2-inch courses of macadam, each course consisting of 225 pounds of crushed limestone to the square yard. The bottom and top courses were penetrated respectively with asphaltic cement at the rate of 1.25 and 1.55 gallons to the square yard. This was topped off with a seal coat of 0.5 gallon of asphaltic cement to the square yard, covered with crushed limestone at the rate of 40 pounds to the square yard.

Around the parking lot is an access

road averaging 20 feet in width and with a total thickness of 8 inches. It is made up of a 1-inch insulation course of stone dust, 90 pounds to the square yard, over which was laid 5 inches of hot plant-mix base course in two 2 1/2-inch courses. On top of the macadam is a 2-inch course of asphaltic concrete, 220 pounds to the square yard, laid with a mechanical finisher.

Quantities and Personnel

The major items in the paving contract for apron and parking lot were:

Unclassified excavation	3,563 cu. yds.
Borrow material	21,600 cu. yds.
Concrete pavement, heavy	22,650 sq. yds.
Concrete pavement, medium	6,730 sq. yds.
Concrete pavement, walks	1,247 sq. yds.
Granular sub-base course	25,290 sq. yds.
Bituminous hot-mix base course*	5,013 sq. yds.
Asphaltic-concrete surface course	5,013 sq. yds.
Bituminous-macadam base course	6,531 sq. yds.
Bituminous-macadam surface course	6,531 sq. yds.

A force of about 40 men was employed in the paving operations. The Breslin Construction Co. was represented on the contract by Howard C. Showalter, Superintendent, while H. S. Gunther was Superintendent for F. A.



C. & E. M. Photo

An Oliver 88 rubber-tired tractor pulls a Bros rubber-tire roller over the granular sub-base of the airport apron. Sand and a hunk of concrete weight down the roller.

Schultz Concrete Construction. W. W. Sanders was Consulting Engineer on the construction for the Louisville and Jefferson County Air Board.

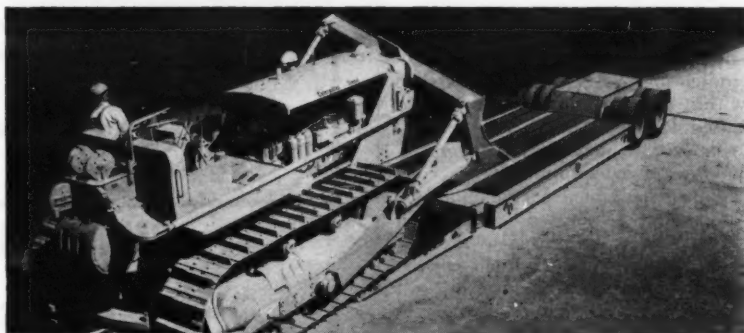
For the Civil Aeronautics Administration, Harry A. Gerard is District Airport Engineer for Kentucky with headquarters at Louisville.

Toben Rejoins Ledeen

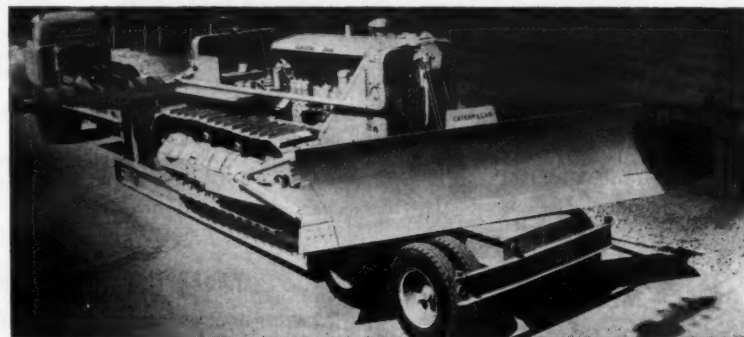
Alexander A. Toben, Mechanical Engineer, has returned to Ledeen Mfg. Co., of Los Angeles. He will take an active part in the sales and application design of Ledeen hydraulic and pneumatic actuating cylinders, and other equipment.

NEW EQUIPMENT

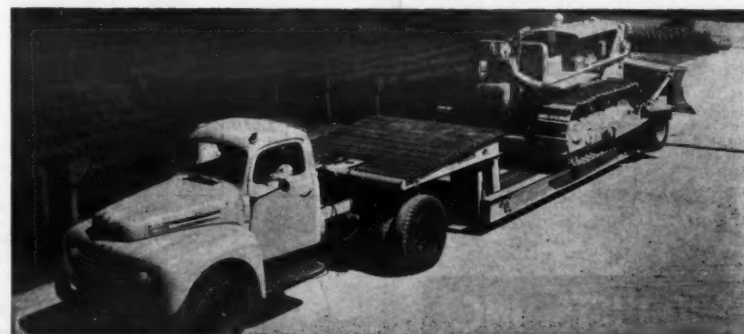
The Martin Machine Company, Kewanee, Illinois, has introduced a new trailer featuring a patented Folding Gooseneck which, when lowered to the ground, forms a loading ramp. The new trailer, in capacities up to 100-tons, eliminates cumbersome loading ramps and cribbing, reduces idle man and equipment hours. Loading can be accomplished by one man in a fraction of the time formerly required by several men. Low platform height, accomplished by front loading, provides greater clearance for viaducts, bridges and wires, assuring fast, safe movement between jobs. Like other Martin "Carryhaul" trailers, the new Folding Gooseneck will be sold exclusively through "Caterpillar" dealers. The sequence photos below show actual operation of the new Martin Folding Gooseneck.



Folding Gooseneck lowered to form ramp for loading D-8 "Caterpillar". Loading ramps and cribbing are eliminated. One man loads.

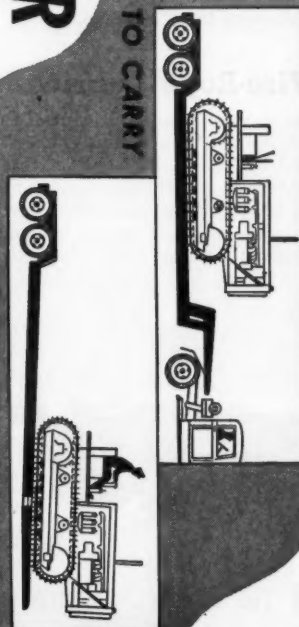


Folding Gooseneck being raised to towing position. Loading is easily accomplished in 5 minutes.



Ready to roll. Note low platform height which provides maximum clearance for viaducts, wires, bridges—greater safety.

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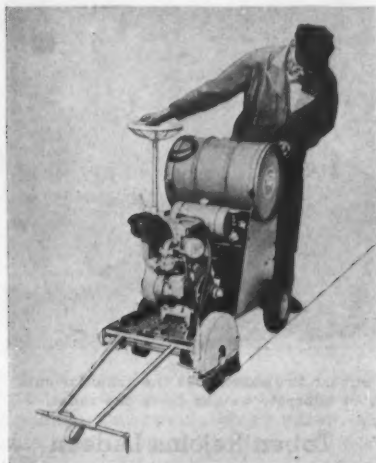
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The new Di-Met standard concrete cutter uses a 12-inch-diameter diamond wheel and cuts to a 3½-inch depth.

New Concrete Cutter

A new concrete cutter developed by the Felker Mfg. Co., Torrance, Calif., uses a 12-inch-diameter diamond wheel set to either the right or left end of the spindle and cuts to a 3½-inch depth. The spindle is ball-bearing-mounted and the diamond wheel can be lowered to the desired cutting depth by a manually operated worm and gear. When cutting is not required, the wheel may be lifted completely clear of the work.

Two sources of coolant are possible with the new Di-Met cutter. Pressurized water may be supplied from mains or tank trucks through a hose to an independent water connection, or a 15-gallon tank may be used to water the blade when other sources are unavailable. Jets force the water stream against the side of the blade to clean and cool it. The unit is portable and may be towed at usual road speeds. It is powered by a 7.5-hp Wisconsin air-cooled gasoline engine.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 96.

Wire-Rope Lubricant

A new wire-rope lubricant, Leadolene Klingfast, has recently been developed by The Brooks Oil Co., Industrial Division, 934 Ridge Ave., Pittsburgh 12, Pa. This product, according to the company, is a leaded petroleum compound, without filler, negative in

corrosion factors, hardening in type, but retaining affinity to metals and flexible pH-ilm to temperatures as low as minus 40 degrees F. The lubricant is made in three grades or viscosities and in two types: one for application with heat, the other with a solvent to eliminate the necessity of heat. The Klingfast lubricant can be applied by pouring, spraying, brushing, or swabbing.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 46.

New Testing Machine Has Two-Unit Design

A new concrete and cement-testing machine of 300,000-pound capacity has been developed by The Baldwin Locomotive Works, Paschall P. O. Station, Philadelphia 42, Pa. Its principal feature is the separation of loading and weighing units to prevent the transmission of load shocks to the indicators; the two-unit design also permits varying their relative positions to suit conditions of use and protect the operator from flying or falling particles of breaking specimens.

The machine is a hydraulic compression type especially suitable for standard concrete cylindrical test specimens. Special bearing blocks are available for testing building blocks 12 inches wide and 18 inches long. The loading unit has a clear space of 18½ inches between columns and a maximum clear space of 26 5/16 inches between ram and upper platen. Ram travel is 10 inches at constant rates up to 7/8 inch per minute. The hydraulic pump is driven by a 2-hp electric motor.

The load indicator consists of two 16-inch-diameter dials with hands driven by Emery precision Bourdon tube gages. Each dial also has a maximum hand. A high-range scale to 300,000 pounds has 500-pound divisions, and a low-range scale to 50,000 pounds has 100-pound divisions. The accuracy of the indicating system is guaranteed to be within plus or minus 1 per cent at indicated load or 0.2 per cent of full scale capacity, whichever is greater.

The rate of load application is controlled by means of a pacing indicator and a manually operated valve which carries the pump discharge to the hydraulic loading cylinder. Load can be increased at a constant rate in unit stress per minute on the test specimen

with minimum manipulation of controls. Automatic protective devices include a cut-out switch to break the power circuit if the shut-off valve for the low-range gage is open when pressure exceeds 50,000 pounds.

Further information may be secured from the company. Or use the Request card at page 16. Circle No. 77.

McIntosh on West Coast

Russell W. McIntosh is now West Coast Representative for the Protective Coatings Division of the Pittsburgh Coke & Chemical Co. His offices are in the Russ Bldg., San Francisco. Mr. McIntosh previously handled sales for the Koppers Co. in the northwest.

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LOWER COST!**

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REINFORCING BARS

**NOW... Available by Number in
Standard Sizes of New A.S.T.M.
Serial Designation
A305-49 Table I**



Thanks to A. S. T. M. specification A305-49, designers now have a more efficient bar for concrete reinforcement... one that provides increased anchorage which when properly used will give appreciable savings in steel and concrete. Advanced design Laclede Multi-Rib Reinforcing Bars exceed the A305-49 specification. They are available in uniform round sections in all standard sizes and can now be ordered by number.

TABLE I A.S.T.M. SERIAL DESIGNATION A305-49

Dimensional Requirements for Deformed Steel Bars for Concrete Reinforcement

Bar No.	Unit Wt. Lbs./Ft.	NOMINAL DIMENSIONS ROUND SECTIONS			REQUIREMENTS OF DEFORMATIONS		
		Diameter-Inches Decimal	Cross Sectional Area Sq. Inches	Perimeter	Max. Avg. Spacing Inches	Min. Height Inches	Max. Gap, Inches
3	0.376	.375	0.11	1.178	0.262	0.015	0.143
4	0.668	.500	0.20	1.571	0.350	0.020	0.191
5	1.043	.625	0.31	1.963	0.437	0.028	0.239
6	1.502	.750	0.44	2.356	0.525	0.038	0.286
7	2.044	.875	0.60	2.749	0.612	0.044	0.334
8	2.670	1.000	0.79	3.142	0.700	0.050	0.383
9*	3.400	1.128	1.00	3.544	0.790	0.056	0.431
10*	4.303	1.270	1.27	3.990	0.889	0.064	0.487
11*	5.313	1.410	1.56	4.430	0.987	0.071	0.540

*These sections have the same weight and area as bars formerly known as 1" Sq., 1½" Sq., and 1¾" Sq.

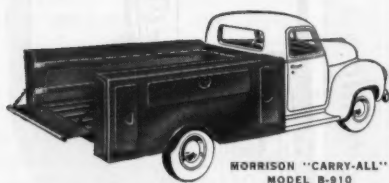
†Chord of 12¼% of Nom. Perimeter.

*Bar numbers are based on number of ¼" included in the nominal diameter of the bar section.



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LACLEDE STEEL COMPANY
St. Louis, Mo.



MORRISON "CARRY-ALL"
MODEL B-910

What are the first two questions an electrical contractor asks about a service body?



1 The first is... HOW'S IT MADE?

2 And the second... WHAT'LL IT DO FOR ME?

And here are the answers...

How's it Made?

"Carry-All's" exclusive design and its extensive tooling and engineering make possible heavy gauge steel construction (with the correct gauge for each component) and a unique bridge-type underbody... and these make possible huskier construction with lighter over-all weight and fewer number of parts than any comparable body on the market. That's why the MORRISON "Carry-All" carries greater payloads — more electrical and contracting equipment and tools!

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The MORRISON "Carry-All" is designed for ready adaptation to any job in the electrical and contracting industries! Morrison made provisions in the basic design for... and has made available a selection of — specialized accessories, so that the basic "Carry-All" can be easily adapted for any purpose! Additional special equipment is available for installation by more than 50 established truck equipment distributors strategically located from coast to coast.

Write today for FREE LITERATURE on the MORRISON "Carry-All", the sensational new "Carry-All" TRAILLETTE, the "Carry-All" SIDE BOXES and accessories.



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Carry-All Body Division

643 AMHERST ST., BUFFALO 7, N. Y.

Should Local Roads Get More Federal Aid?

No, Says BPR Report—Local Government Itself Can Supply Most of the Needed Funds, and Untraveled Roads Can Be Dropped

OVER a year ago, the Subcommittee on Roads, of the Senate Committee on Public Works, began hearings on a much-disputed subject: the extension of Federal Aid to local rural roads. But the groups testifying were in such violent disagreement that Senator Dennis Chavez (D., N. Mex.), Chairman of the parent Senate committee, asked the Bureau of Public Roads to study the problem and make a special report. Early this year that report was made public. Here are its conclusions, in brief:

Local government units themselves can supply most of the money needed to improve local rural roads; additional Federal Aid is not necessary. The report says that these units "have a capacity to make greater contributions than they now make to the financing of local road needs". It places that greater capacity at between \$100,000,000 and \$250,000,000 a year, and calls the sums "both reasonable and possible".

There's "an unquestionable need" for improving secondary and local rural roads, says the Bureau. But there's "an equally unquestionable need" for improving primary rural highways and principal city arteries—and the second need far exceeds the first in point of cost.

Traffic a Criterion

It has been argued that farmers do most of their driving on local roads and therefore derive little benefit from improvements made on primary and secondary roads. The facts do not support this, according to the report. In 1948, 83 per cent of all travel in rural areas was on a combined system of state and Federal-Aid primary and secondary roads.

Moreover, about 40 per cent of the 2,500,000 miles of local roads serve only 10 vehicles a day or less. The report suggests that many roads in this 40 per cent are "wholly nonessential", that their existence "cannot be justified by any consideration of economic or social need", and that they should be vacated as public ways—permanently eliminated as a drain upon public highway revenues. It estimates that there are 400,000 miles of such roads that might be abandoned.

The average traffic on all local rural roads is about 56 vehicles a day. But the 202,000 miles that have thus far been taken into the Federal-Aid system of principal secondary roads serve an average of 212 vehicles a day. If all local roads serving 100 vehicles a day were incorporated in the F-A system, it would mean adding about 100,000 miles. On the 1,800,000 miles remaining outside the Federal-Aid system, the average daily use would be 24 vehicles a day.

Cost of Improvements

The report declares that about 1,200,000 miles of local roads need to be improved, and that such an improvement would cost about \$6,000 a mile or a total of \$7,200,000,000. A 10-year corrective program, then, would require an outlay of \$720,000,000 a year for construction, about \$500,000,000 for maintenance, plus 4 per cent for administrative and engineering costs—or a grand total of \$1,269,000,000.

More and more, says the report, local rural roads tend to be supported by state-collected revenues. In the 20 years from 1927 to 1947, the relative contri-

bution which local government units made to the support of local rural roads was cut more than half, from 81 to 39 per cent. The failure of local units to sustain their share of the financial burden when state revenues have been made available "raises grave doubt of the depth of their interest in working out a solution of the financing problem".

Better Administration Needed

Local road administration must be improved, says the report. But before it can be, there must be better laws. The backbone of the state-local-relations law should be a state-aid program managed by the counties or local units with state assistance in planning, establishing priorities of improvement, and selecting road systems; state ap-

proval of plans and programs; and adequate provisions to insure a minimum standard of performance.

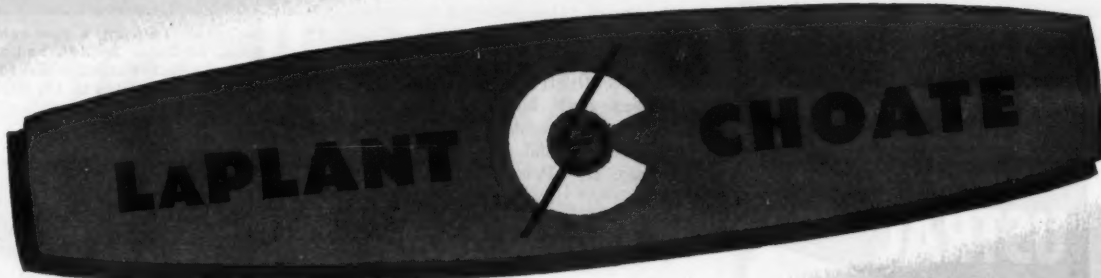
The report shows that engineers have charge of road work in only 850 counties out of the 2,800 reported—and 90 per cent of that total operate in only 12 states. Engineering supervision of local road operations should be required by law in all states, says the report. And where it is not feasible for a local unit to employ its own engineering services, two or more units might well jointly share the services of an engineer.

If you want to get hold of a copy of "Local Roads", write to Ben F. Ostergren, Manager, County Division, American Road Builders' Association, 1319 F St., N. W., Washington 4, D. C.

Metal-Cutting Band Saws

A 4-page circular describing two metal-cutting band saws has recently been prepared by the Johnson Mfg. Corp., Albion, Mich. Specifications given in the literature point out that the Model J, designed for both wet and dry cutting, has a capacity of 10-inch round and 18-inch flat; while the model B will handle 5-inch round and 10-inch flat. This equipment, the folder points out, is designed to trim or cut metal pipes, rolled bars, or structural-steel shapes. Illustrations of these portable units in operation are included. Instruction features are highlighted.

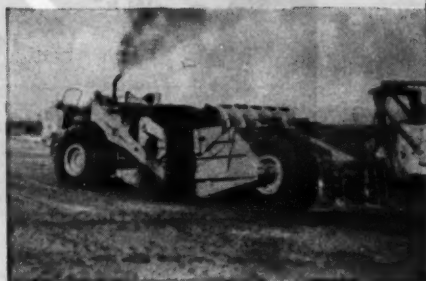
This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 67.



... the sure sign of more and more profitable earthmoving jobs!



One of the ways J. Robert Saxley uses Motor Scrapers for coal stripping at Mt. Carmel, Pa.



Brown Construction Co. is piling up high yardage totals at Deming, New Mexico.



Henry Deolger picks 4 Motor Scrapers to move 12 million yards of sand at Westlake, Calif.



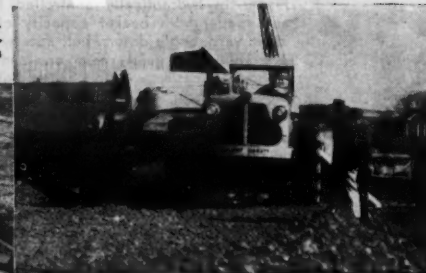
Two LPC Motor Scrapers are working for Bayer & Mingolla on the Route 2 by-pass, Leominster, Mass.



Four LPC Motor Scrapers are speeding operations on the Bonbrook Dam for List & Clark, Ft. Worth, Texas.



For the Burlington Railroad relocation project at Chillicothe, Mo., Perry McGlone uses two Motor Scrapers.



Patterson Construction Company has three units working on the Pennsylvania Turnpike at Steelton, Pa.

LAPLANT CHOATE



LPC TW-300 Motor Wagon



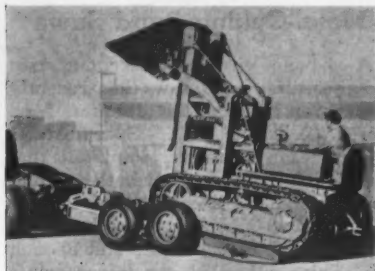
LPC Hydraulic or Cable Operated Dozer



LPC Ripper



LPC Tampers



For the sake of easy loading and clearance, the platform of the new Carryhaul 333 tilting trailer is only 16 inches from the ground.

Low-Platform Trailer

A new tilting-type trailer with a low platform for more overhead clearance has been announced by the Martin Machine Co., Kewanee, Ill. The new Martin Model 333 Carryhaul is built 16 inches from ground to platform. The low height is designed to afford an easy loading incline and easy clearance under viaducts, overpasses, etc. The all-

welded frame has a carrying capacity of 6 to 11 tons. The "walking-beam action" assembly is designed to permit tires to follow road irregularities. The platform tilts to allow equipment to be loaded over the rear. The unit measures 8 x 18 feet overall.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 49.

Average Equipment Rentals

The fifth edition of the "Compilation of Rental Rates for Construction Equipment", published by the Associated Equipment Distributors, is now available. Monthly, weekly, and daily rental rates on 266 major items of construction equipment are included. Information was secured from equipment distributors throughout the United States, and the published rates represent overall averages of rates charged by individual companies for specific types of equipment. Actual rates in local areas may differ greatly from these averages.

Copies may be obtained from the Executive Office, Associated Equipment Distributors, 360 N. Michigan Ave., Chicago, Ill. Price: \$3.00.

Catalog on Locomotives

A 44-page catalog describing a complete line of gasoline, diesel, and diesel-electric locomotives is offered by the Plymouth Locomotive Works, a division of the Fate-Root-Heath Co., Plymouth, Ohio. These locomotives range from 2½ to 75 tons and are made in both standard and narrow gage. The catalog presents the complete line, listing sizes and types available and indicating specifications and capacities.

This literature may be obtained from the company by requesting Catalog LG-49, or by using the Request Card at page 16. Circle No. 57.

Sales Engineers for Lincoln

The Lincoln Electric Co., Cleveland, Ohio, has increased the welding engineering staff in several of its district offices. J. W. Brooks had been appointed to the Boston area office; J. J. Chemerys is serving industrial accounts in the Syracuse territory; W. R. Karll is with the firm at Newark, N. J.; and R. G. Todd has been added to the staff at Tulsa, Okla.

Powerful · Versatile USTRAC

NOW AT
NEW LOW PRICES



CHECK THESE FEATURES

- ✓ **LOWEST PRICE EVER . . .**
USTRAC is now priced lower than ever before. Pound for pound and—inch for inch it is the best tractor buy on the market.
- ✓ **MANEUVERABLE . . .**
Ruggedly constructed—designed for heavy-duty work. Only 37-inches wide, USTRAC is perfect for confined areas.
- ✓ **FOUR SPEEDS—INSTANT REVERSE**
USTRAC has four forward and reverse speeds instantly selected by lever eliminating unnecessary stopping. Exclusive USTRAC feature.
- ✓ **INEXPENSIVE TO OPERATE . . .**
Owners report fuel consumption of dependable Continental engine under \$1.50 per day.
- ✓ **EQUIPMENT . . .**
Finger-tip hydraulically controlled front end loader with bucket capacity of ½ cubic yard, angle dozers, bull dozers, etc., available with quick, easy one-man attachments. Easily works 14" three-bottom plow.

CLARK PARTS AVAILABLE . . .

The Clark Airborne—the tractor used by Seabees and Army engineers during the war—was the forerunner of the USTRAC. Many parts are interchangeable. If you need Clark parts check with The Federal Machine & Welder Company, Warren, Ohio.

ASK TO SEE COLOR FILM OF USTRAC IN ACTION!

**SOME DEALERSHIPS
STILL OPEN!**



WRITE
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THE FEDERAL MACHINE & WELDER COMPANY
DEPT. 600 WARREN, OHIO
I AM INTERESTED IN USTRAC. PLEASE SEND ME COMPLETE INFORMATION.

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COMPANY _____
ADDRESS _____
CITY _____ STATE _____

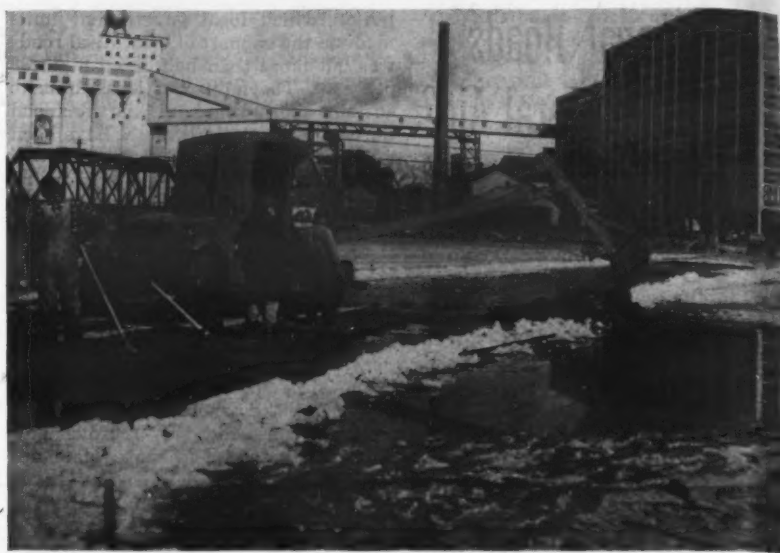
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(Will Not Cause Nausea)



"PEP-UP" Impregnated (controlled dissolving) SALT TABLETS offer an amazing advancement in salt tablets. The controlled dissolving releases some salt immediately, which insures quick salt replacement, but not in sufficient quantities to cause nausea. Write for literature and prices. Available in Expendable—throw away Dispensers.

Meets Government specification SS-S-31C

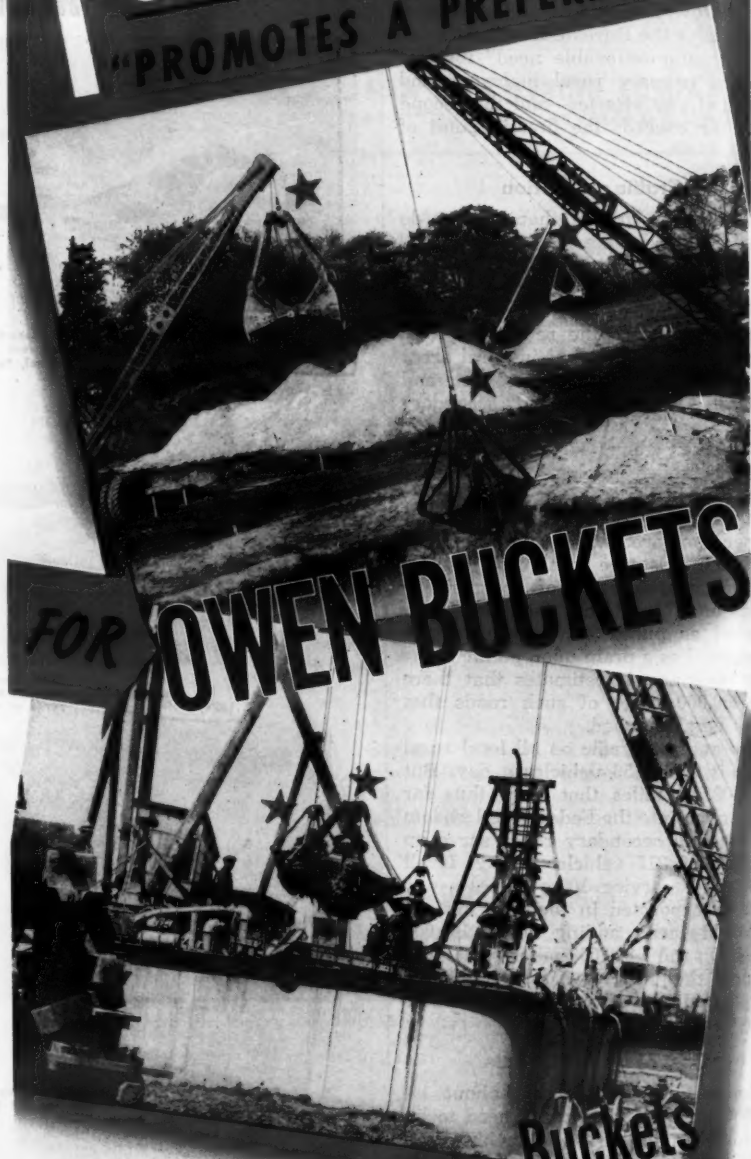
UNITED STATES SAFETY SERVICE CO.
KANSAS CITY 8, MO. BRANCHES IN PRINCIPAL INDUSTRIAL CITIES



Before it could lay a new cable for the Iowa Electric Light & Power Co., Hennessey Bros., of Cedar Rapids, had to cut a trench in the bottom of the frozen-over Cedar River. A lightweight Schield Bantam trencher, working from planks, completed the 700-foot excavation in 1½ days. The Bantam weighs 8 tons, digs to a depth of 14 feet.

Performance that

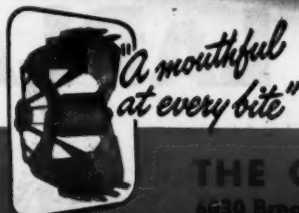
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France Constructs Big Power Project

One Dam Completed, Two in Progress, on Project Which Involves Lock System and 20 Power Plants

By PHILLIP L. MELVILLE, Associate Research Engineer, Council of Highway Investigation and Research, Charlottesville, Virginia

♦ DESPITE the adverse chaotic conditions of the post-war period, French civil engineers are progressing with the Rhône River project, known as the CNR. The aims of the CNR are the production of hydro-electric power, the irrigation of fertile land in the Provence region, and navigation from Geneva, Switzerland, through Lyon and Marseille to the Mediterranean Sea. A system of locks will be built and not less than 20 power plants are blueprinted. The total electrical output is to be some 2,500,000 kw or 13,000,000,000 kwh.

The financing of such projects is a big question mark. With inflation what it is, no one will give an estimate. That the job will be done is all that is known by engineers and contractors. The French Government (which has sponsored the CNR) pays the bill one way or another. There are not enough contractors to handle big jobs in France, and uncertain economic conditions do not encourage them to enter into long-lasting ventures. The CNR had to establish trusts by consolidating various companies (for Seyssel: Schneider, Joya-Chabert, Dayde, Babcock & Wilcox, Delattre & Frouard; and for Donzère-Mondragon, a coordinating group known by the initials S.A.C.T.A.R.D.). Bids were taken but it was more a face-saving affair than anything else.

As of now, one dam has been completed at Genissiat, two are under way at Seyssel and Donzère-Mondragon. Some minor projects have been started or had previously been completed. From an engineering aspect, the Genissiat project is quite spectacular, especially when viewing the various handicaps resulting from the war and the German occupation.

Genissiat Dam

The Rhône River was detoured from the dam site through two tunnels, each 900 square feet in cross section and 1,900 feet long. The total amount of earth work (including rock and alluvium) was close to 850,000 cubic yards. How was it done? This is a somewhat puzzling question since hardly any equipment was available at the time (1940-1945) except the picks and shovels of laborers and some worn-out machinery—mostly odd pieces of equipment which any of our contractors would have junked in a hurry.

The dam itself is of the gravity type, curved with a 15,000-foot radius. It is about 260 feet high above the bed of the river, and its crest is 341 feet above the lowest part of the foundations. It is 29.5 feet wide at its crest and 459 feet long between the two cliffs. The base of the dam, including the foundation of the plant, has an overall width of 328 feet.

Concrete came from a central mixing plant on the right bank of the river. The mixers were of French make and similar to ours. Aggregates, which came from the river bed about ½ mile downstream, were washed and sorted before being stockpiled in concrete silos; the maximum size of the coarse aggregate was about 7 inches for mass concrete and 2½ inches for structural members. Cement, of the portland type, was also stockpiled in silos.

Some 209,437 tons of portland cement and slag cement went into the dam concrete; 5,510 tons were used for other purposes, mainly grouting. A total of 1,618,900 cubic yards of concrete was required for the project—831,885 cubic yards of plain concrete, 45,780 of reinforced concrete, 575,520 cubic yards for abutments, and 164,805 for the power plant. It is interesting to note that the 10,000 tons of steel bars used for reinforcing were plain; it seems that deformed reinforcing bars are unknown in France.

Artistic considerations were quite important. Stone veneers were used extensively and the interior of the power plant with its grey marble walls, red enameled machines, and clever lighting is of impressive beauty.

Seyssel Project

In order to regularize the flow of water downstream from the dam, the Seyssel project was created. Though it will also produce electric power, its primary aim will be to compensate for the variations of flow resulting from the variable output of Genissiat. The extent of the water storage area at Seyssel was limited by the location of a main-line railroad which could not be detoured in this mountainous region. A mean flow of some 12,000 cubic feet will be used to produce 45,000 kva with three turbines rotating at 75 rpm.

Methods of construction on this project are more like those used in this country. As a matter of fact, some U.S.-made equipment is to be seen. Though some of the shovels are French

and made by Nordest, several others are inscribed Bay City. They are all rated at 500 liters. Air compressors are all imported and are either Chicago Pneumatic or Ingersoll-Rand. But the main tools on this project, as on any other French construction project, remain the picks and shovels of the 1,000 laborers.

The concrete is manufactured in a central mixing plant and pumped up to 600 feet with French concrete-pumping equipment. The cement used is similar to our Type I, though some slag cement has been used. A reserve of 500 tons is kept on hand at all times. For one cubic yard of concrete, about 550 pounds of cement are used, but the proportions are still computed by volumes

(Concluded on next page)

"Caterpillar" Hydraulic Controls



Use VICKERS BALANCED VANE PUMPS

Caterpillar No. 46 and No. 44 Hydraulic Controls use Vickers Balanced Vane Type Pumps for their dependable source of hydraulic power. These front mounted controls have a world-wide reputation for responsiveness, reliability, low maintenance and minimum down-time.

Vickers Vane Pumps have many advantages in addition to the hydraulic balance and cartridge assembly illustrated below. Their initial high operating efficiency continues because correct running clearances are automatically maintained. The no-load starting characteristic is an important feature in cold weather. Space requirement is small in proportion to hydraulic output. Working pressure is up to 1000 psi (continuous duty). Write for Bulletin 36-12 and Bulletin 49-52, which illustrate and describe the advantages of Vickers Vane Pumps for mobile equipment.

TO HELP ASSURE:
Fast, Responsive Control
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Long, Reliable Service
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Minimum Maintenance
and Down-Time
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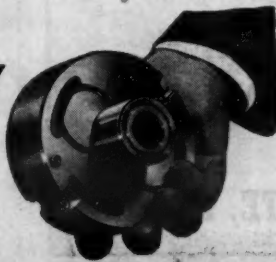
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

3984

VICKERS

Cartridge Assembly

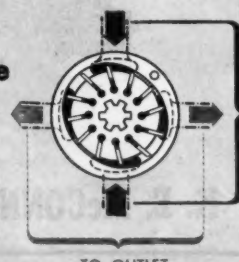
This cartridge contains all the pumping parts that move . . . none of them contact the housing. Inspection and removal of all working parts can be made without disconnecting piping or drive coupling.



VICKERS

Hydraulic Balance

With this patented construction, bearing loads are cancelled out by equal and opposing radial hydraulic thrust loads as shown in diagram. The result is longer pump life with minimum maintenance.



TO INLET

TO OUTLET

France Constructs A Big Power Project

(Continued from preceding page)

(the ratio of coarse to fine aggregate is about 7 to 3). An unusually large amount of concrete is needed, since the dam is located on an outcrop of soft sandstone which had to be deeply excavated for foundations. When the dam is completed, hardly any concrete will be seen: hard stone veneers are being placed everywhere. If you observe that this is a very expensive process, you are told that concrete might wear out in a century or so, that hard stone transported a few hundred miles is cheap—and besides, it looks so much better than concrete!

The water gates for the Seyssel project present some interesting features. Thanks to a very clever device called the Chanoine Gate, from 0 to 100 per cent of the water may flow. The gates are about 7 x 25 feet, weigh 10 tons, and are mounted on hinges at their lower part. They can lean at almost any angle toward the downstream part of the riverbed and are telecommanded. Less than 3 minutes will be required to change the position of any gate at any time.

Donzère-Mondragon

The third of the major projects at present under way is farther downstream between Lyon and Marseille at Donzère-Mondragon. Even from an American point of view it is a big undertaking, with the total amount of earth work about half the yardage of the Suez Canal. It has only recently been started, mostly with Marshall Plan equipment.

As a whole, engineering in France varies from a pure science in the design room to a craft in the field. Labor is very cheap and everything else is unbelievably expensive. Elegance and beauty are often considered more important than efficiency and economy. However, the CNR has obtained results which might not have been obtained in the United States under such adverse conditions.

Personnel

The Genissiat project was under the able direction of M. Mariang, the Seyssel project is under M. Patriarche, and the Donzère project is under M. Rosagni. It was thanks to the kind courtesy of M. Bourgin, Chief Engineer of Bridges and Highways of the Sixth Electrical District of France, and of M. G. Halbronn, Engineer of Bridges and Highways, that we were able to visit the projects of the National Co. for the Rhône River.



A general view of the Seyssel project. The cofferdam permits excavation of the power-plant site in the foreground. The concrete plant is in the back at the left.

Communication Unit

A feedback-type microwave repeater, designed for operation in the 5925-8000-megacycle band, which is available to governmental agencies and industrial services, is now manufactured by the Industrial Division of Philco Corp., Philadelphia 34, Pa.

Capable of handling up to 32 two-way voice channels or combinations of voice channels, program channels, and coded intelligence, the Philco CLR-type microwave repeater is said to permit multiple chain repeats with very little distortion. It makes possible the use of only one microwave oscillator tube for both transmitting and receiving functions of a single-direction repeater.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 6.

Need information on equipment?
Use Request Card at page 16.

New Cutting Tools Are Safety-Tested

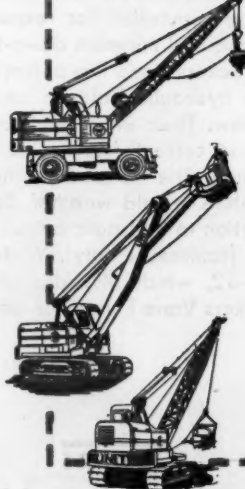
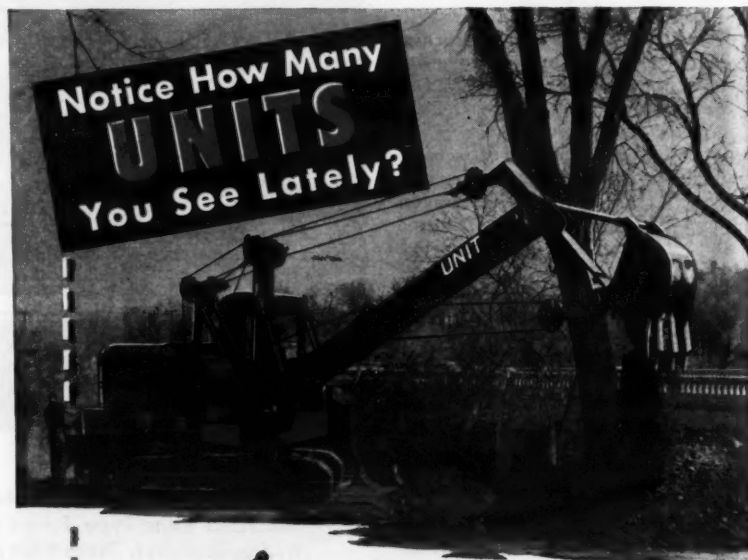
Safe-T-Kut cutting tools made by the Delaware Tool Corp., Wilmington, Del., are safety-tested before they are distributed, according to an announcement by the company. The tools in the Safe-T-Kut line include hand chisels, pneumatic and electric hammer chisels, center punches, paving-breaker steels, back-out punches, blacksmith's tools, etc. Their special safety features include: magnetic-particle inspection of each tool to reveal defects which the eye cannot see; special design of the striking ends of hand tools to diminish their tendency to spall or mushroom; and special heat treatment of the striking ends of the hand tools.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 40.

A Step to Safety

The dangerous practice of climbing on and jumping off truck beds can be eliminated with a new truck step offered by Truk-Step Co., Inc., 182 Verdugo Ave., Burbank, Calif. The step is a complete unit which mounts with four 1/2-inch carriage bolts under the truck bed, and it is designed to support a load of 1,000 pounds. In extended position it provides two risers of approximately 12 inches; in closed position it will clear a 7-inch skirt. The Truk-Step can be mounted on the sides or rear of trucks, vans, trailers, or semi-trailers. Its 8 3/4 x 16-inch tread has a self-cleaning non-skid feature.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 72.



FULL VISION CAB
for
GREATER
SAFETY

Everywhere . . . on all types of jobs . . . you see UNITS operating at peak efficiency. They LIFT . . . LOAD . . . HAUL . . . DIG . . . with speed and precision, and with power to spare.

UNITS are chosen for the tough jobs because they are carefully engineered and ruggedly constructed, backed by a quarter century of experience building shovels and cranes exclusively. The new FULL VISION CAB provides maximum visibility. Operator sees in all directions. Promotes safety.

UNITS are available in 1/2 and 3/4 yard excavators and cranes up to 15 tons capacity. Crawler or mobile type...Fully convertible to ALL attachments . . . Diesel or gas engine. Write for literature.

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4309 W. Burnham St. • Milwaukee 14, Wis., U.S.A.

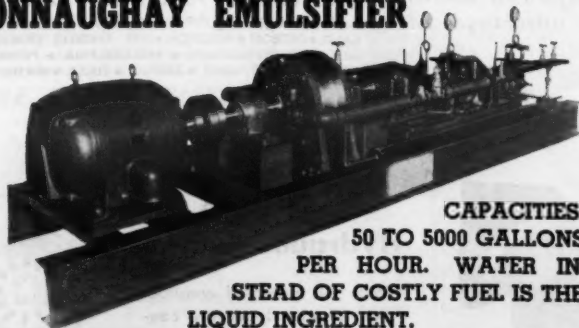
LET US TELL YOU
THE REASONS WHY

UNIT

ASPHALT EMULSIONS

Are "Tailormade" to the requirements of each job in this

McCONAUGHAY EMULSIFIER



CAPACITIES:
50 TO 5000 GALLONS
PER HOUR. WATER IN-
STEAD OF COSTLY FUEL IS THE
LIQUID INGREDIENT.

K. E. McCONAUGHAY - LAFAYETTE, INDIANA



Here is the Model 20-D hydraulic rod and chain cutter with a Manco air-hydraulic pump that operates off any source of compressed air supplying 100-pound pressure.

Hydraulic Rod Cutter

A new portable hydraulic cutter designed to cut large-diameter chain and rod is offered by the Manco Mfg. Co., of Bradley, Ill. Called the Manco Guillotine Model 20-D, it cuts reinforcing rod, stainless steel, and Monel of 3/4-inch diameter; mild-steel rod of 1-inch diameter; 1-inch soft chain; and 3/4-inch hard chain. The cutting unit has an open C-Frame anvil that will take hexagonal and square-shaped material.

The unit is available with hand, air-hydraulic, or electric hydraulic pump. It weighs 46 pounds and is designed for field use as well as in shops. Other units for cutting power cable to 3 1/2-inch diameter and wire rope to 1 1/4-inch diameter are also available.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 65.

New Lift Truck

A new series of heavy-duty Liftrucks, available in 5, 7 1/2, and 10-ton capacities, have recently been offered by the Silent Hoist & Crane Co., 841-872 63rd St., Brooklyn 20, N. Y. The dual pneumatic traction tires are mounted on a "dead" axle which supports the chassis and fork load, relieving the differential drive from this service. The lifting guides are interlocked to provide alignment and equal distribution of the fork loads. Ground clearance is ample, the company says. Shovels, special forks and fork extensions, power spreaders, and rotary aprons for forks, special winches, and crane booms are available for use with the Liftruck.

Further information may be secured from the company by asking for Bulletin No. 76. Or use the Request Card at page 16. Circle No. 144.

Welding Fittings

Welding fittings and flanges made in many types and sizes are manufactured by Tube Turns, Inc., Louisville 1, Ky. Ranging in size from 1/2 to 30-inch—the regular line of seamless forged carbon-steel Tube-Turn welding fittings and forged carbon-steel flanges covers more than 4,000 items.

The complete line of Tube-Turn welding fittings includes 90-degree elbows, 180-degree returns, straight ties, reducing outlet ties, crosses, reducers, caps, saddles, laterals, and lap-joint stub ends. They are also available in special metals and alloys—types 304, 347, and 116 stainless; carbon moly and chrome moly; copper; aluminum; Monel; Inconel; nickel; and wrought iron. These fittings are leak-proof and form a continuous metal structure with pipes. Free of protruding flanges and bolts, they save space and weight.

Further information may be secured

from the company. Or use the Request Card at page 16. Circle No. 13.

Mandt Moves to Michigan

Mandt Mfg. Co., formerly in Columbus, Ohio, has moved its general offices to 10421 Haggerty Ave., Dearborn, Mich. There all production has been affiliated with that of the Transmission & Gear Co., which has for some time been supplying transmissions, axles and drives, etc. for Mandt swing loaders and excavators. Under the new arrangement all engineering and manufacturing are by Transmission & Gear, which has recently built an additional factory just for the assembly of Mandt units.

Pneumatic-Tired Disk Wheel

A circular describing the new Geneva D-140 pneumatic-tired disk wheel, 4.00 x 18, for concrete carts, sprayers, portable saws, line markers, trailers, and other types of portable equipment, has been prepared by the Geneva

Wheel Co., 1013 Railroad St., Geneva, Ohio. The wheel's features and specifications are fully covered in the bulletin.

This literature may be obtained by requesting Bulletin No. 1013 from the company, or by using the Request Card at page 16. Circle No. 74.

Sells Dowflake in East

The Dow Chemical Co., Midland, Mich., has named a new Dowflake salesman, John P. Manley, Jr., to serve Pennsylvania, Delaware, Washington (D.C.), and southern New Jersey.

Built for the LONG HAUL!

the RUGGED MILLER

MODEL "B" Tilt-Top

Designed for heavy duty—this tough Tilt-Top facilitates the movement and loading of heavy equipment. The frame of the Model B is all steel and built of 12" deep, tapered channels braised from corner to corner with 3" channels. The Miller straight through axle is integral with the frame and features 3 1/2" dia. solid steel, stub inserts. Dual Budd wheels and hubs, tires, platform, Timken bearings and plate eye are all standard equipment.



IMMEDIATE DELIVERY \$975.00

The following equipment is optional and extra. Hydraulic tilt control, two speed winch, electric brakes.

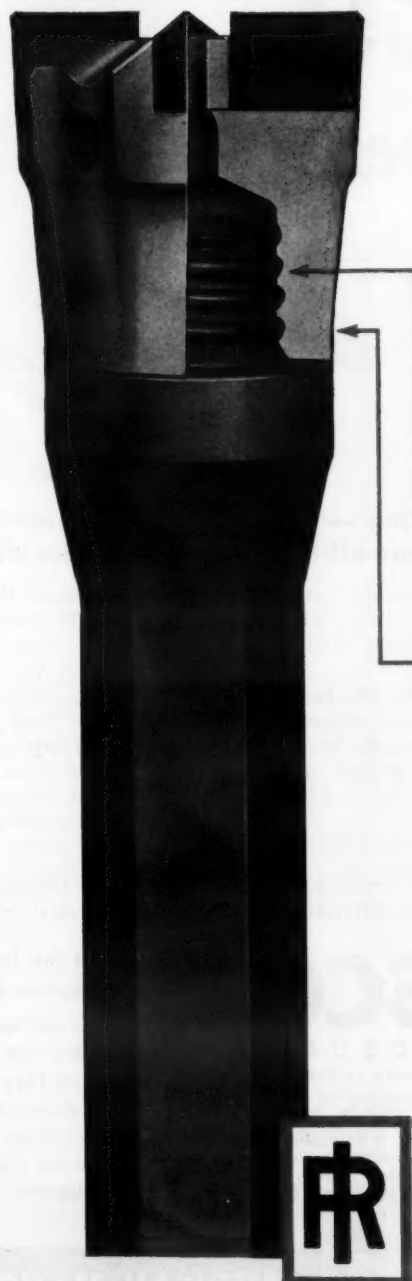
RAY MILLER RESEARCH ENGINEERS

DEPT. 360, 727 W. BURNHAM ST. MILWAUKEE 4, WIS.

Now CARSET JACKBITS give even better performance

... with this new attachment developed exclusively for use with tungsten carbide bits

(Series 100 Carset Jackbits)



The experience gained in the field with hundreds of thousands of Carset Jackbits, has enabled Ingersoll-Rand engineers to develop an attachment that matches the revolutionary performance and long life of Carset Jackbits. It is the only attachment now available designed primarily for use with tungsten carbide bits.

This new attachment incorporates a patented 38-degree reverse buttress thread. After exhaustive tests, it was selected as the best design to cushion and absorb the destructive reciprocating and rotational forces that tend to wear bit threads or break the threaded extensions on drill rods.

In addition, the attachment permits appreciably more metal in the skirt walls of Carset Jackbits which greatly increases their body strength. This added metal makes the strongest possible bits. This is particularly important in small bit sizes.

In short, even greater economies are now possible from Carset Jackbits. This new attachment is designed to give trouble-free service for the life of the bit.

The Ingersoll-Rand Series 100 attachment is offered in four sizes and covers bit gauges from 1 3/4 inches to 3 inches. It is easy to make this attachment...up-set the drill rods on a sharpener

and form the threads on an engine lathe or a Toledo threading machine. Write today for full information to Ingersoll-Rand Company, New York, or any of our 27 domestic branches.



Ingersoll-Rand

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ROCK DRILLS • COMPRESSORS • AIR TOOLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • OIL & GAS ENGINES

Distributor Doings

From Classroom to Plant and Back

Such is the saga of Frank A. Nikirk, Engineer with Milton-Hale Machinery Co., Inc., Albany, N. Y., who has accepted an appointment as visiting professor of engineering at the University of California.

The University, which is initiating a specialized training program to prepare young engineers to enter the construction field, needed a man with plenty of field experience to help set up the course. Mr. Nikirk's appointment came about after Henry M. Hale, President of Milton-Hale, heard of the problem confronting the engineering college and offered Mr. Nikirk's services on behalf of his company.

In accepting this assignment from Milton-Hale, Mr. Nikirk pointed out that the development of the construction industry has been the result of on-the-job pioneering, and that his main job would be to isolate those elements which make for advances and to create a pioneering atmosphere in the classroom as well as the field.

Besides Mr. Nikirk's experience with Milton-Hale, he has worked since his graduation from Stamford for the Southern Pacific Railroad Co., Caterpillar Tractor Co., Thew Shovel Co., and as City Engineer of San Leandro and San Jose, Calif.

Nelson Now Onan Distributor

The Nelson Equipment Co., of Portland, Oreg., has been named a distributor for D. W. Onan & Sons Inc., electric generating plants in several counties of Idaho and the state of Oregon. Scott Corbett, Jr., is President of the Portland firm.

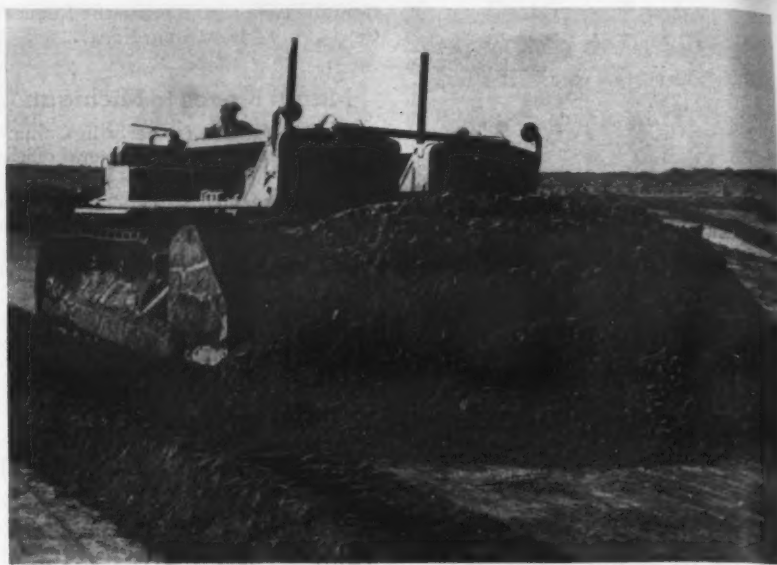
Peterson Teams Up D8's

Inspired perhaps by the half-remembered sight of a team of horses, Buster Peterson of Peterson Tractor & Equipment Co., San Leandro, Calif., paired two Caterpillar D8 track-type tractors. The resulting package has 269 drawbar horsepower at less than the price of two D8's.

Getting the D8's to work together involved a process slightly different from the one your grandfather used to harness Blacky and Bess. Peterson first

removed one track and final drive assembly from each D8. He then made a special hard bar so that the two tractors could be bolted together at the final-drive housing, installed a plate on the back of the housings, and made necessary linkages for controls.

The control system consists of two gear-shift levers, two steering-clutch levers, one master clutch lever, and two throttles mounted on the left arm rest. The throttles can be used to give gradual power turns as each engine drives one track only. The standard steering clutches may be used for sharp turns, or a pivot turn can be executed by having one transmission in reverse and the other in a forward gear. Transportation is made easy by bolting skids under each engine and unbolting the hard bar and final drive housings.



Not "Gee" and "Haw" but a system of gears and throttles makes this team respond. Buster Peterson of the Peterson Equipment Co., San Leandro, Calif., teamed up these D8's to get a 269 drawbar horsepower.

Look for the name
AMSCO*
on the dipper
you specify...



Amsco Engineering — plus Amsco Manganese Steel Construction — means more efficient, more profitable shovel operation.

Profit is determined by handling costs per yard, and here are 2 important reasons why you can lower those handling costs with AMSCO Dippers:

Austenitic Manganese Steel—For Longer Life—
The more you use an Amsco dipper, made of manganese steel throughout, the harder it gets! Surfaces that are subject to impact and abrasion actually work-harder and take on a high polish for added wear-resistance.

Manganese Steel—"the toughest steel known"—

withstands the most severe breaking stresses. **AMSCO Engineering—For Better Operation—**
Years of Amsco design experience bring you a complete line, from which you can select dippers "custom-engineered" to your own requirements . . . for deep penetration, full loading and positive dumping. Whether you need manganese steel Welded, Missabe, Renewable Lip types, or special designs for unusual service, you'll get longer wearing life and greater economy when you specify Amsco.

NOW! Prompt delivery of Amsco Dippers and Parts

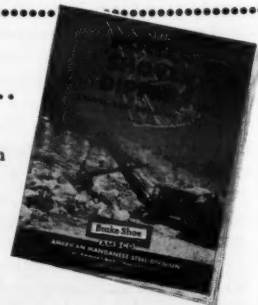
AMSCO
WELDING PRODUCTS

The fast, low-cost way to get worn or damaged equipment back in service.

Amsco hardfacing rods make important on-the-job savings . . . keep down time at a minimum. Contact your supply house or Amsco representative for information on the complete Amsco line of Welding Rod, Weldments and Repointer Bars.

Get the facts on the complete Amsco Line...

This 40-Page booklet is packed with information on Amsco Dippers, and parts for shovels and drag-lines. Write today for your free copy . . . ask for Bulletin No. 547 DS.



jari CUTS
12 MILES A DAY!



Think of it . . . one man cleans up 12 miles of highway shoulder in a single day . . . with Jari. Yard wide knife cuts weeds, mows park lawns. Light easy-to-handle Jari cuts on steep slopes . . . gets in where big rigs can't.

HERE'S GOOD NEWS
Jari Power Spray Attachment kills weeds with 14 foot wide spray. Hose reaches trees. Write for full details.



jari
POWER SCYTHE AND SPRAY

Jari Products, Inc.
2940R Pillsbury Ave.
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AMERICAN

Brake Shoe

COMPANY

AMERICAN MANGANESE STEEL DIVISION

395 EAST 14th STREET • CHICAGO HEIGHTS, ILL.



Seal Shaw, left, President of Shaw Sales & Service Co., and his son, W. B. Shaw, who is in charge of the new plant at Riverside, California.

Shaw Sales Has Three Plants

With the recent opening of a plant in Riverside, Shaw Sales & Service Co. offers the southern-California construction industry three conveniently located plants for new equipment, rental, parts, and service.

W. B. Shaw is in charge of the Riverside plant at 1651 E. Eighth St. Leonard Willard is Parts Manager and J. L. Jones heads the 4-man service department. Mack Ramsey and Fred A. Pofahl are handling sales in San Bernardino, Riverside, and Imperial Counties.

Ed F. Copenhafer is Manager of the San Diego plant at 2127 Newton Ave. He handles sales in the city, and Gerald Bridgewater takes care of county sales. W. A. Dunlap is Parts and Service Manager.

At the Los Angeles plant, 5100 Anaheim-Telegraph Road, Carl W. Hess is Sales Manager, Lester Pogue is Parts Manager, and Oscar Bobo is Service Manager. Thurston Waltonen is in charge of air-compressor and pneumatic-tool repair and service. Richard L. Stryker, formerly West Coast Manager for American Hoist & Derrick, has been added to the office sales force. E. W. Eidson, formerly with Western Machinery Co., is Manager of the air-compressor and pneumatic-tool division.

Halbert Hickman is in charge of the crawler-tractor and earth-moving-equipment division at the main plant, J. R. Hedding is in charge of contractor sales, and Elmer Johnson is in charge of county and municipal sales. W. R. Stone, James McCrae, W. W. Hiserodt, and W. W. Conner are Sales Engineers.

Jack Reynolds, with headquarters in Santa Barbara, is in charge of sales for Santa Barbara, Ventura, San Luis Obispo, and Kern Counties.

Buchanan Equipment Moves

The Buchanan Equipment Co. of Kansas City, Mo., moved to 939 W. 8th St. on March 31. The enlarged facilities at its new address will make better service possible.

Files & O'Keefe Serves Maine

Files & O'Keefe Co., Portland, Maine, is now handling Warco motor graders and Hercules road rollers in Maine for the W. A. Riddell Corp., Bucyrus, Ohio. R. L. Files is President of the distributor company, W. M. Wright is General Manager, and Ronald Hawkes is Service Manager.

O'Leary Adds Compressors, Mixers

O'Leary's Contractors Sales & Service Co., of Chicago and Joliet, Ill., has taken on two new lines in addition to Thor, Gorman-Rupp, Sterling Wheel, and Roth products. It is now exclusive agent in Chicago for Muller's 3-cubic-foot mortar and plaster mixer; it also handles all other Muller mixers on a non-exclusive basis. The other line the company has added is the Gordon

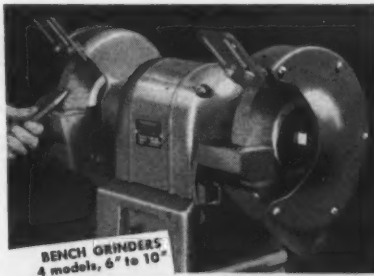
Smith compressor; O'Leary is exclusive northeastern-Illinois agent for that company.

Dealers Wanted for Truck Loader

The Ernest Holmes Co., Chattanooga, Tenn., maker of a new self-loader for dump trucks, is looking for dealers. The company is introducing the loader through a special staff of factory representatives who travel in truck demonstrators appointing distributors among established dealers. If you are interested, write directly to the company for territory still available.

News of Koehring Dealers

The Koehring Co., Milwaukee 16, Wis., manufacturer of heavy-duty construction equipment, has appointed two new dealers to represent it and its subsidiaries: Kwik-Mix Co., C. S. Johnson Co., and Parsons Co. The new dealers are the Rowen-Leahy Co., 40 Midland St., Hartford, Conn., whose territory covers part of Massachusetts (Continued on next page)



Van Dorn POWER helps you SPEED UP GRINDING JOBS!

Buy Van Dorn Bench Grinders to bring the work to the tool. Buy Van Dorn Portable Grinders to bring the tool to the work. Bench models have more working clearance, better tool sharpening support. Portable models are perfectly balanced, easy to handle. Both are built with high-quality parts for extra years of service, driven by powerful Van Dorn motors for non-stop performance! See your nearby Van Dorn Distributor. Write for catalog to: THE VAN DORN ELECTRIC TOOL CO., 787 Joppa Road, Towson 4, Md.

FOR POWER SPECIFY

"Van Dorn"

PORTABLE ELECTRIC TOOLS

(DIV. OF BLACK & DECKER MFG. CO.)



NEW! IMPROVED! 1950 MODEL

The new 1950 Whiteman Power Buggy does the work of six men with wheelbarrows. It hauls concrete, sand, brick, mortar... anything you can load in or on it... over soft earth, up 25% grades, to upper floors, over light scaffolds, through doorways. Turns in its own length. Capacity enlarged to 13 cu. ft. or 2,000 lbs. Speed increased to 16 mph. New dumping mechanism improves leverage, gives operator positive control of the dump. Weight is reduced to 692 pounds. Powered by 7.5 h.p. 4 cycle, air-cooled engine, has automatic clutch and speed changer. The versatile, tough, dependable Whiteman Power Buggy has thoroughly proved itself with large and small contractors for many years. Priced to pay for itself in a short time. Send coupon now for details and name of your nearby distributor. Write today!

WHITEMAN MANUFACTURING CO.
3249 Casitas Ave., Los Angeles 39, Calif.

Whiteman Power Buggy



Climbs 25% grades with ease.



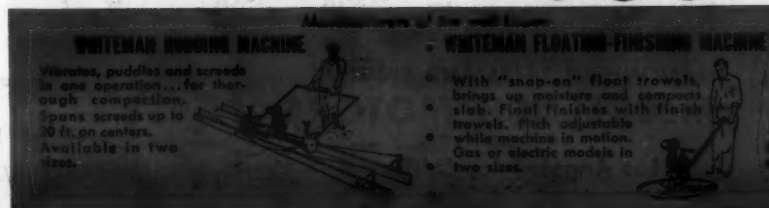
Also available with dumping stake-type body.

New "in gear" mechanism gives sure control of dump & return.

SEND NOW!

WHITEMAN MANUFACTURING CO.
3249 Casitas Ave., Duette, Los Angeles 39, Calif.
Please send me name of distributor, literature and prices on Whiteman Equipment.

Name _____
Company _____
Address _____
City _____ Zone _____ State _____



WHITEMAN FINISHING MACHINE

Finishes, puddles and screeds in one operation... for thorough compaction. Spans screeds up to 10 ft. on centers. Available in two sizes.

WHITEMAN FLOATING-FINISHING MACHINE

With "snap-on" float trowels, brings up moisture and compacts slab. Float finishes with finish trowels. With adjustable while machine in motion. Gas or electric models in two sizes.

Distributor Doings

(Continued from preceding page)

and Connecticut, and the Lou Garriss Equipment Co., 2921 2nd Ave. S., Birmingham, Ala., in Alabama and northwestern Florida.

Three Koehring dealers have opened new branch offices. The Empire Equipment Co., Sioux Falls, S. Dak., has a new branch office at 823 3rd Ave., Aberdeen, S. Dak. The Moore Equipment Co., Inc., Stockton, Calif., has opened at 903 Del Paso Blvd., North Sacramento, Calif. And the W. W. Williams Co., Columbus, Ohio, has established a branch at 1260 Conant St., Maumee, Ohio.

The C. S. Johnson Co. has appointed E. M. Wakeman & Associates, P. O. Box 1042, 2806 Carolina Ave., Lakeland, Fla., its distributor in northern Florida and southern Georgia. It will distribute the complete line of Johnson cement-handling and concrete-batching equipment. Johnson has also named Coast Equipment Co., San Francisco, its sales and service representative in northern California.

New Parts Co. Wants Jobbers

The recently formed Alloy Steel Corp., 7501-7 Union Ave., Cleveland 5, Ohio, is looking for dealers. Under the trade-mark name Asco, the company stocks a line of maintenance repair parts and accessories, including grouser steel for crawler tractors, tractor bolts and nuts, high-carbon cap screws, and seat cushions for tractors and similar equipment.

If you are interested in a distributorship write to the company.

Eriez Dealer News

Eriez Mfg. Co., Erie, Pa., has been appointed exclusive distributor in the United States and Canada for the RCA electronic metal detector. The detector warns of any metal present in material being processed. It can be set up to halt conveyor belts, or to signal by a bell or light.

Wallace W. Mojden, formerly Chief Engineer for Eriez, is now associated with Mills-Winfield Co., Chicago distributor of Eriez permanent non-electric magnetic separators.

**For Construction
Maintenance and Repairs**

PUNCH-LOK
HOSE CLAMPS
AND FITTINGS

LOOK—It's locked for Safety



**Today's Best Bet
For Leakproof
Hose Connections**

Write for Catalog and Air Leak Cost Chart

PUNCH-LOK COMPANY

Dept. A, 324 N. Justine St., Chicago 7, Ill.



On-the-spot radio broadcasts made H. O. Penn's April open house at its newly enlarged Poughkeepsie Branch building a real get-together for the whole area.

H. O. Penn Holds Get-Together

H. O. Penn Machinery Co. of New York City threw out the welcome mat on April 22 to contractors and state and city officials interested in heavy-con-

struction equipment. Starting at 10 in the morning, visitors were shown around the company's newly enlarged building on Dutchess Turnpike. Sales, parts, and service personnel stationed

throughout the building answered questions about special exhibits and shop equipment. Movies featured Caterpillar tractors, bulldozers, and earth-moving equipment. After a buffet luncheon, factory experts gave talks about the equipment and its application to construction and road maintenance problems. Special entertainers and announcers were on hand at 4:30 to conduct a 30-minute broadcast from the Penn building over station WEOK.

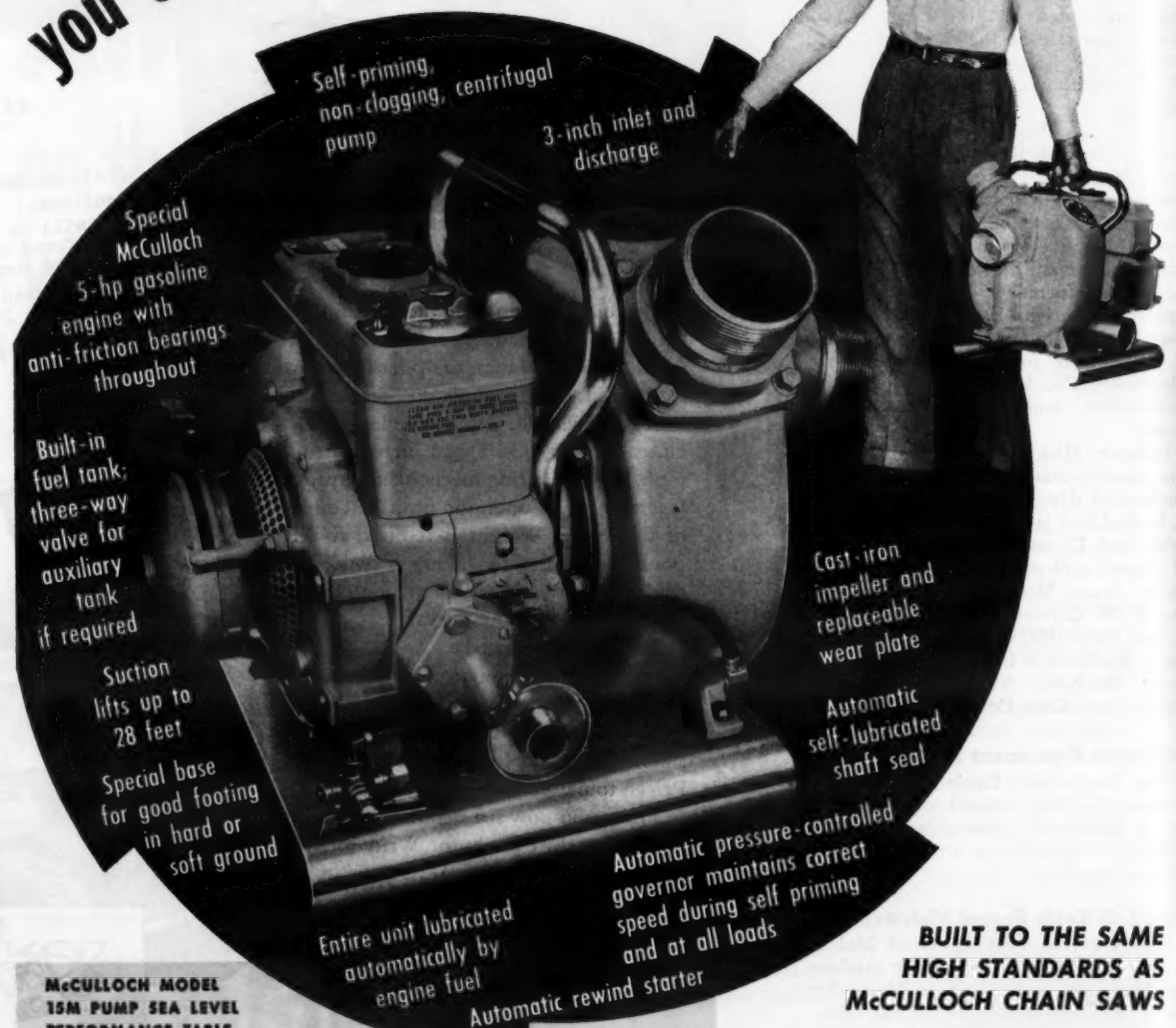
The enlarged building has 150 feet of showroom space along the Turnpike, and is completely equipped to service or rebuild any type of construction equipment. In the Service Department an overhead crane system covers the entire working area. Adequate yard facilities have been provided for outdoor work, day or night.

Hydrocrane in Montana, Florida

Westmont Tractor & Equipment Co., of Missoula, Mont., is now handling the Hydrocrane for Bucyrus-Erie in 12

(Concluded on next page)

**Here's a 15,000 GPH Pump
you can carry in one hand!**



**Engine
and pump
together
weigh
only
57
pounds**

**McCULLOCH MODEL
15M PUMP SEA LEVEL
PERFORMANCE TABLE**

TOTAL HEAD INCLUDING FRICTION	HEIGHT OF PUMP ABOVE WATER			
	10 Ft.	15 Ft.	20 Ft.	25 Ft.
30 ft.	250 GPM			
25 ft.	245	210 GPM	170 GPM	
30 ft.	235	205	165	130 GPM
40 ft.	215	190	160	125
50 ft.	185	145	145	120
60 ft.	135	130	125	105
70 ft.	65	65	65	60

**NATIONWIDE SALES AND SERVICE
McCULLOCH MOTORS
CORPORATION**

Los Angeles 45, California

Export Department: 301 Clay St., San Francisco 11, California, U. S. A.

**BUILT TO THE SAME
HIGH STANDARDS AS
McCULLOCH CHAIN SAWS**

SEND COUPON TODAY

**McCULLOCH MOTORS CORP. Dept. ME
Los Angeles 45, California**

Please send me complete details on the
McCulloch Model 15M Pump.

Name _____

Address _____

City _____ Zone _____ State _____

counties along Montana's western border and in Glacier National Park. The counties are Beaverhead, Deer Lodge, Flathead, Granite, Lake, Lincoln, Mineral, Missoula, Powell, Ravalli, Sanders, and Silver Bow.

In 10 southwestern Florida counties, Epperson & Co., of Tampa, is handling the versatile crane. The counties are Charlotte, DeSoto, Hardee, Highlands, Hillsborough, Lee, Manatee, Pasco, Pinellas, and Sarasota.

Both distributors also handle Bucyrus-Erie $\frac{3}{4}$ to 4-yard gasoline, diesel, and single-motor electric excavators.

Represents Kewanee in Harrisburg

Since April, the Thomas F. Burke Co. has been representing Kewanee Boiler Corp. in the Harrisburg, Pa., territory. Burke is at 221 N. Second St. in Harrisburg. Its territory for Kewanee consists of the counties of Perry, Dauphin, Lebanon, Cumberland, Lancaster, Franklin, Juniata, Mifflin, Snyder, York, and Adams.

Lippmann Holds Service School

The Lippmann Engineering Works, Milwaukee, Wis., held its third annual Sales and Service School, March 15-17. Distributors from all over the United States and from several other countries attended. The session featured demonstrations of Lippmann equipment and stressed the importance of better service methods.

To Manage Dealer Aggregate Sales

Donald H. Gott has joined Great Lakes Carbon Corp., New York City, as Manager of Dealer Sales of the Building Products Division. He will be in complete charge of sales for Permalite plaster aggregates, concrete aggregates, and other building products. He

used to be with the U. S. Gypsum Co. and Mengel Co.

Handles Stooddy Alloys in East

Morris, Wheeler & Co., Inc., Fox St. and Roberts Ave., Philadelphia 29, is now representing the Stooddy Co. in eastern Pennsylvania, Metropolitan New York, Long Island, and the entire states of New Jersey, Maryland, and Delaware. A complete stock of hard-facing alloys is carried for immediate delivery.

Branch Plant for Lancaster

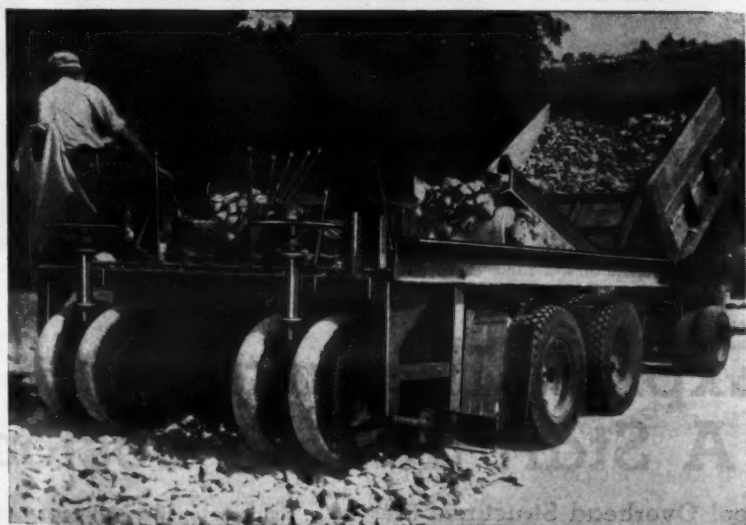
The Lancaster Engineering Corp., distributor of Buda and Wisconsin engines and allied equipment in Lancaster and Hazleton, Pa., has established a branch at 206 N. 11th St., Philipsburg, Pa. Ned Beezer will be the LEC Sales Representative for the Philipsburg territory and Guy Urban will be the Assistant Service Manager.

Lubrication Data Book

A 44-page data book, No. 1-50, on lubrication and lubricants has recently been released by the Lubriplate Division of Fiske Brothers Refining Co., 129 Lockwood St., Newark 5, N. J. It is designed to be of interest and value to those in charge of operation and maintenance of mechanical equipment. It describes various types of fluids and greases for a diversity of applications in industry. It gives general data on the company's products and recommendations for application on construction equipment.

This lubrication data book may be obtained from the company, or by using the Request Card which is bound in at page 16. Circle No. 44.

it pays off



APSCO BASE PAVER

This self-powered, "dump-truck pushing" paver can easily handle 160 tons per hour. It's APSCO's newest paver—incorporating years of designing and field experience. Oscillating, leveling screed accurately controls depth, banking and crown. Adjustable spreading width. Practically no hand labor! *We invite comparison!*

Send for new full line folder—CE-56

ALL PURPOSE SPREADER CO. Erie, Ohio U.S.A.



The Dallett Dal-edge Moil Point

By employing the practical wedge principle to the Dal-edge Moil Point Dallett gives you a tool that will break pavement and concrete with greater efficiency than was ever possible to obtain with conventionally designed Moil Points.

Wedge Design Spreads Fracture Easier — Quicker

From the moment the point of the tool enters the concrete, wedge design progressively widens the fracture as power is applied. The wider part of the tool shatters the penetrated area. Forged by Master Craftsmen, Dal-edge Moil Points have the tradition of 66 years of Quality Toolmaking behind them.

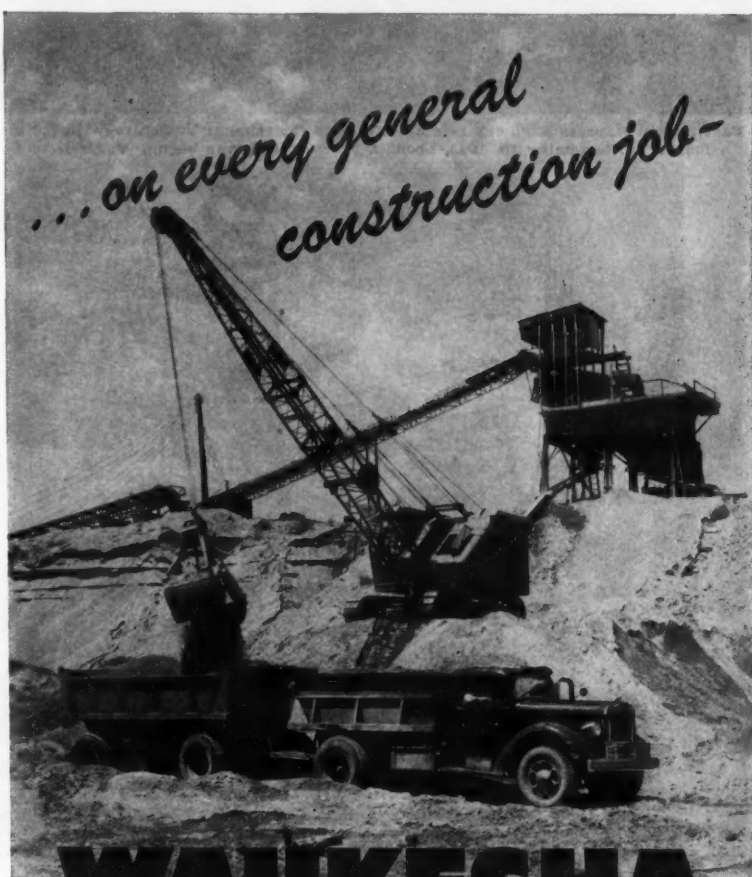
Send for Dallett Bulletin C-220



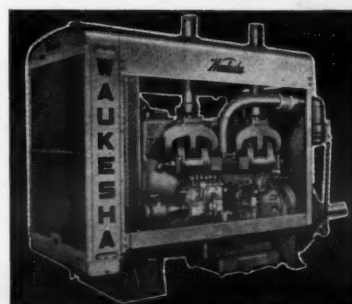
THE DALLETT COMPANY

MASCHER AT LIPPINCOTT STREET, PHILADELPHIA 33, PA.
Manufacturers of Pneumatic Tools and Accessories

DISTRIBUTORS in principal cities throughout the United States, Canada, Europe and South America.



WAUKESHA Diesel POWER UNITS



WAUKESHA Super-Duty DIESEL (6-WAKDU)
six cylinders, 6 1/4-in. x 6 1/2 in., 1197 cu. in.
displacement, 210 hp. maximum

WHY are Waukesha Diesels so specially adapted to the general contractor's needs—for powering rock crushing, gravel screening-washing machinery, conveyors, shovels, cranes, pumps, mixers, pavers, hoists, and portable compressors and generators...

Outstandingly lively pick-up... quick response to power demand... high economy... ability to burn cleanly all modern "high speed Diesel fuels" of 45 cetane or above... starts easily... runs smoothly... maintenance is simpler and costs less... and Waukesha

Diesels are easy to understand and operate. They range all the way from the small four-cylinder with a maximum of 29 hp., to the largest six-cylinder with its 357 hp. maximum. Bulletin 1418 tells you how Waukesha builds dependability into these Diesels—send for it.

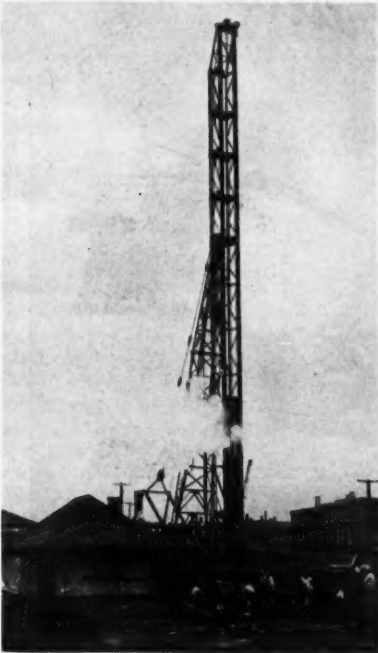
WAUKESHA MOTOR COMPANY
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NEW YORK • TULSA • LOS ANGELES



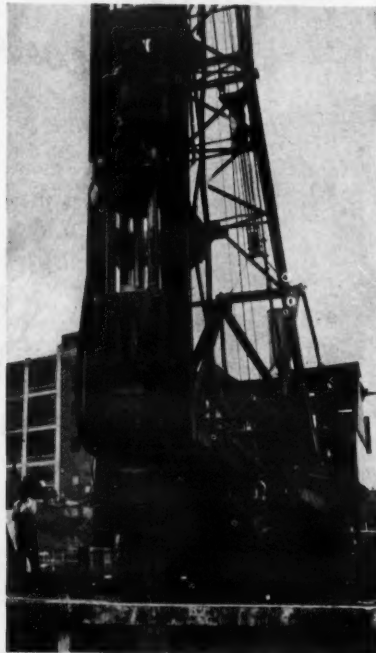
The East Boston Express Highway resembles a huge interchange structure with its maze of ramps and roadways. This is the way it looked on September 19, 1949, about a year after it was begun. V. Barletta Co. of Boston has the first-stage contract.



A Raymond Concrete Pile Co. rig drives H-piles for the elevated structures.



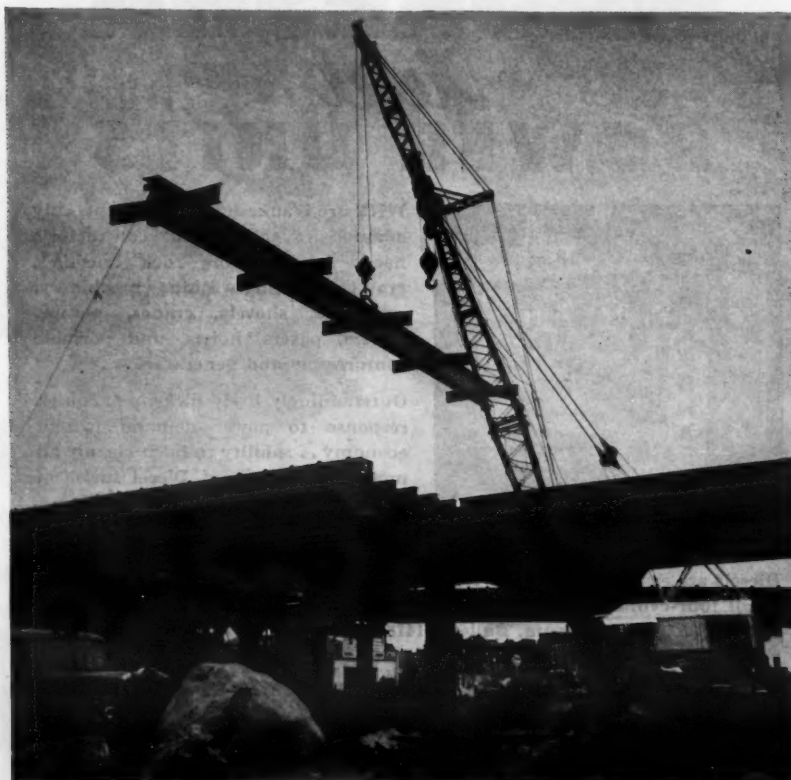
The H-piles, 14-inch 89-pound sections, totaled 660—the concrete piles, 2,407.



Here, a Vulcan No. 6 hammer working at bent 7 on the south structure.



At the north structure, a Lima crane with a 40-foot boom and a 20-foot jib picks up an 80-foot 36-inch I-beam stringer weighing 10 tons.



Express Highway Gets A Start at East Boston

Steel Overhead Structures on Piles Are Included in the First Stage of Construction; Has Connection to Airport

† THE East Boston Express Highway is taking shape under the largest single contract ever awarded by the Massachusetts Department of Public Works. This first-stage construction, on a new route connecting the Sumner vehicular tunnel with McLellan Highway, was awarded to the V. Barletta Co. of Boston on a low bid of \$5,357,770.50. Construction on the 3,700-foot partly elevated primary route got under way in August, 1948, and is scheduled for completion by June 30 of this year. This section has overhead structures at the north and south ends connected by a highway at grade. Interchange road-

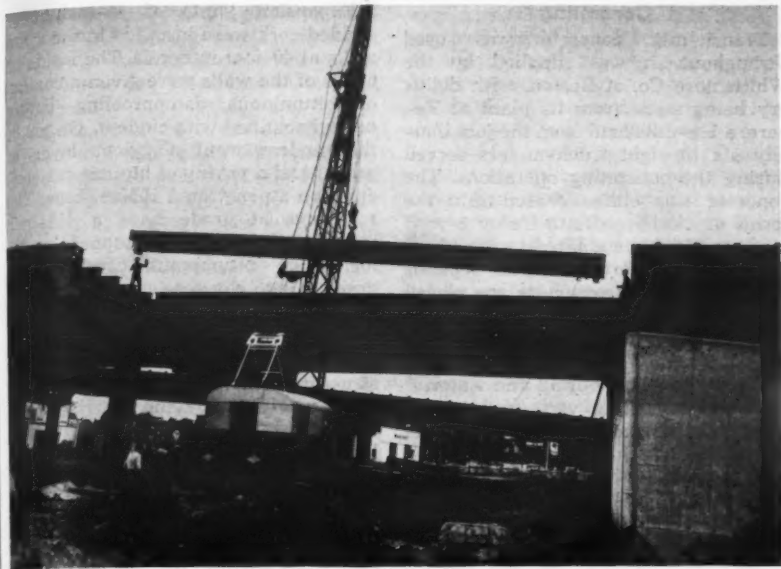
ways connect to Logan International Airport.

Other contracts in the future will extend the elevated section southward with down ramps leading to the entrance of the Sumner Tunnel which goes under the inner harbor to downtown Boston. The northern elevated structure will also be extended with down ramps connecting with McLellan Highway, Route C1, and then on to points along the northeastern coast of Massachusetts. When completed, the project will have an overall length of 5,885 feet. It will speed traffic between downtown Boston and highways leading to the north and east. The present route through the narrow streets of East Boston is one of the most highly congested in the metropolitan area. It is especially bad in the summer when the beach resorts are in full swing and the Suffolk Downs race track, a few miles north of the airport, is in operation.

C. & E. M. and Mass. Dept. of Public Works Photos

The diaphragms are bolted to the stringer and the crane raises it (see next page).

(Continued on next page)



C. & E. M. Photo
The crane is about to set the stringer between bents 60 and 61. On this main structure there are 18 such stringers plus two fascia girders.



C. & E. M. Photo
On deck the riveting crews rivet the diaphragms to the stringers. This steel structure will support a 7-inch reinforced-concrete deck slab.

feet, both for one-way traffic. The 24-foot roadways included two 12-foot lanes, while the 40-foot roadways were designed for three traffic lanes of 14-12-14 feet. Some of the approach ramps, 37 feet wide, carry three lanes of one-way traffic. The longest of the ramps, one leading from the airport, measures 470 feet. At grade level two 36-foot

roadways, with an additional 10-foot-wide parking lane, are separated by a grassed median strip.

Pile Driving

Both the steel H-piles and the concrete cast-in-place piles were driven by the Raymond Concrete Pile Co. of New (Continued on next page)

The improvements beyond the ends of the present work are delayed because of the difficulty in finding homes for people now living in houses that must be moved to make way for the extension of the expressway.

The administration building at the airport is about 3,500 feet from the new elevated structure, so connecting roads will be built leading to airport ramps of the expressway, which are being built under the present contract. Traffic will thus be speeded between the airport and downtown Boston when the southerly end of the project is extended. Upon completion of the present contract, easy access will be afforded to traffic between Logan Airport and points north of Boston.

Elevated Structures

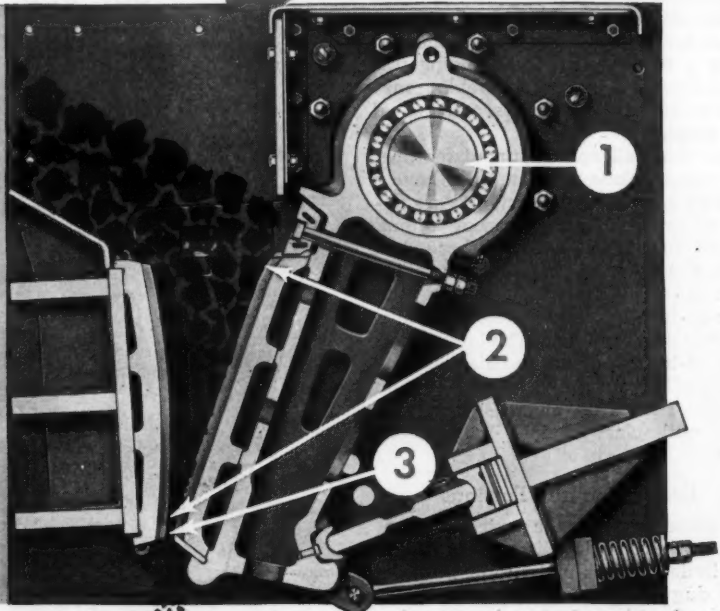
With the exception of a 1,100-foot section at grade in the middle of the contract, the rest of the express highway is elevated. In addition to the ramps leading to the airport, seven other ramps will take the traffic up and down from overhead to ground. The project resembles a huge interchange structure with its maze of ramps and roadways. New right-of-way was provided for the portion at grade. The Boston & Albany Railroad also had to make extensive track relocations in its freight yard adjoining the right-of-way on the west. The structure crosses tracks at several locations.

The overhead structures are of steel, while the up and down ramps have reinforced-concrete walls with cinder fill in between. Steel H-piles support the elevated work, and the ramp walls rest on cast-in-place concrete piles. Most of this land area was once a shallow bay that had been filled in over the years. Beneath some peat deposits and assorted overburden, exists a stratum of blue clay, typical to the coast around Boston, as much as 120 feet thick. Consequently the steel piles were driven with lengths ranging from 55 to 180 feet to get down to refusal. This required considerable splicing.

The structural-steel framework was widest at the north end where it measured 157 feet out to out. Elsewhere the roadways were usually either 24 or 40

1 speed 2 long jaws 3 long stroke

It Takes ALL 3



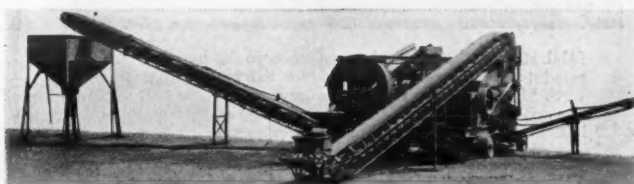
to put the maximum amount of rock through a jaw crusher

A-W design takes full advantage of these basic requirements.

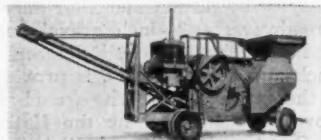
That's why these heavy-duty crushers turn out so much rock.

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Austin Western

Express Highway Gets A Start at East Boston

(Continued from preceding page)

York City. The H-piles, 14-inch 89-pound sections, totaled 660 in number, while the concrete piles added up to 2,407. Two similar Raymond oil-burning pile-driving rigs were on the job at various times for driving both types of piles. These crawler rigs had 96-foot leads with their tops 104 feet above the ground. The steel piles were driven with a Vulcan No. 0 hammer, and the shells for the concrete piles with a Vulcan No. 1 hammer. A mandrel was used in connection with the shell piles.

The H-piles, as well as all the steel reinforcing for the project, were furnished by the Bethlehem Steel Co. The piles were shipped from the company's Sparrows Point, Md., plant in 60 to 80-foot lengths. On arriving at a siding in the yards of the B. & A. adjacent to the job, they were unloaded by a Lorain crane with an 80-foot boom. The rig picked up the piles and drove them to practical refusal; the design is for a total load of 80 tons per pile.

The 180-foot piles, the longest on the job, were driven in three 60-foot sections, field-spliced at each joint. Splicing was done by welding ½-inch diamond-shape plates, one on each flange and one on the web; the flange plates are 10 inches square and the web plate is 9 inches square. Welding was handled with four Lincoln welding machines—three at 200 amps and one at 300 amps.

For the wall and abutment footings, the cast-in-place concrete piles have a minimum spacing of 3 feet, and are designed for an allowable load of 40 tons. Nearly 70,000 linear feet of these shell piles were driven in lengths varying from 20 to 70 feet. The shorter piles have 11-inch tips, and increase in diameter 4 inches in 10 feet. The longer piles have 10-inch tips, with the diameter increasing 1 inch for every 8-foot section length. The sheet-metal shells were filled with class D 3,000-pound concrete.

Excavation and Footings

In some places on the project the peat and overburden deposits were 12 to 14 feet in depth. This undesirable material was dug out by a Lorain dragline equipped with a 60-foot boom and a Page 1½-yard bucket, and hauled away to spoil areas. These excavated areas were backfilled to grade with gravel material, spread and compacted in 12-inch layers by three Caterpillar dozers. On roadways, a 24-inch gravel base, spread and compacted by bulldozers in 12-inch and 6-inch layers, is provided over the entire project. The gravel and borrow were supplied by the Hathaway Construction Co. of Wakefield, Mass., from its pits off the Newburyport Turnpike in the Peabody-Middleton area—a haul of about 20 miles. The dirt-moving was handled by a fleet of up to 50 Sterling trucks holding 7 yards each. All material was weighed at the job and paid for at a ton price.

Concrete footings over the steel piles varied as to size and shape with the average around 12 x 14 x 5 feet deep. The steel piles project one foot into the concrete. Several Jaeger pumps, 2, 3,

and 4-inch units, were used to unwater the footings before they were poured.

For the cantilever-type ramp walls, the footings were continuous with a 2½ to 3-foot depth and a maximum width of 17 feet. This widest footing was under the highest, 28-foot 3-inch wall. The cast-in-place piles project one foot into the wall footings. The walls average 18 inches in width at the top, and taper out on both sides to a bottom width of 2 feet 4 inches. A maximum grade of 5 per cent occurs on only one ramp; grades on the others are less steep. The opposite footings are tied together with 1¼-inch rods encased in concrete. Every 40-foot section has two such beams containing 2 to 8 rods depending on the height of the wall above.

Forms for the walls were faced with ¾-inch plywood on the exposed surfaces, and 1-inch boards at the rear. They were held with 2 x 6 studs on 12-inch centers, and double 2 x 6 wales on 36-inch centers through which passed Richmond ¾-inch ties.

Concreting

Transit-mix concrete was used throughout. It was supplied by the Whittemore Co. of Boston, with delivery being made from its plant at Revere, a 1½-mile haul from the job. Usually six to eight truck-mixers served during the concreting operations. The concrete was either chuted into the forms or discharged into Insley 1-yard buckets which were lifted to the forms by cranes—a Lorain crawler type or truck crane. As the concrete was placed it was vibrated by Ingersoll-Rand pneumatic vibrators powered by I-R 105-cfm portable air compressors. Curing was done with burlap and water.

Class A concrete was used in the footings and ramp walls. Concrete placed above ground had Darex added at the rate of 14 to 20 cc per cubic yard giving the concrete an air content of from 4 to 6 per cent. The dry weights of a typical one-yard batch were:

Cement	560 lbs.
Sand	1,230 lbs.
Gravel	2,010 lbs.
Water	34 to 37 gals.

Expansion joints of ½-inch pre-molded cork were installed in the ramp walls at 40-foot intervals. The inside or backs of the walls were given a coating of bituminous dampproofing before being backfilled with cinders. On top of the cinders went a 2-foot layer of gravel and a paving of bituminous concrete on a penetrated B.M.A. base. The roadways at grade have a 4½-inch macadam base which is topped by 2¼ inches of bituminous concrete put down in two courses.

Steel Erection

The fabrication and erection of the structural steel for the overhead structures was done by the Harris Structural Steel Co. of New York City, with Bethlehem furnishing the raw material. Material was delivered to a spur track right on the job site where two crews handled the erecting and four crews did the riveting. Two Lima 2½-yard crane rigs with 40-foot booms and 20-foot jibs were used on the erecting. Boom

(Concluded on next page)

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USE U. S. RUBBER NON-BURST HOSE FOR TOP SAFETY
WHEN WORKING WITH DANGEROUS MATERIALS



CLEANING BRICK OR STONE requires a hose that resists the cutting effect of the sand or steel shot passing through it. U. S. Rubber's Sand Blast Hose has a tube especially designed to withstand such abrasion—and its 4 plies of cotton duck give a strong, flexible body, prevent dangerous kinking or whipsaw.



FATAL SCALDING can easily happen when you're handling saturated steam pressures up to 200 pounds. Safety councils approve U. S. Matchless Steam Hose because it cannot burst. Recommended for pile drivers, oil refineries service, steam supply lines in railroad yards, and many other uses.



INSIDE STORY. If, after long service, steam finally penetrates the inner lining of U. S. Matchless Hose, the steam merely seeps through the cover, which has become porous, indicating replacement should be made. Note the construction features above.

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lengths were increased to 60 feet for the high work. A Sterling truck with Fruehauf trailer moved the heavier pieces from bent to bent when it was necessary.

A typical bent for a 40-foot roadway consists of a pair of built-up steel columns on 30-foot centers. These columns consist of three wide-flange sections: a 27-inch x 94-pound web section riveted to two 14-inch x 176-pound flange sections. They support a box girder that averages 4 feet in depth. These bents average 80 feet apart, varying to suit special conditions. The north end of the structure has some 4-column bents in which the spacing is 30 feet 8 inches, 35 feet, and 33 feet between columns. The box girders these H-columns support are 66 inches deep. Across the box girders go 36-inch I-beam stringers which weigh as much as 10 tons. Stringers are on 5-foot centers, and have transverse diaphragms on 20-foot centers measured longitudinally. Expansion joints are provided at alternate bents.

Concrete Deck Slab

The steel superstructure supports a 7-inch Class F air-entrained reinforced-concrete deck which was laid in forms held by Richmond hangers. The concrete was handled by crane and bucket and poured in 20-foot lanes continuous from bent to bent. As the top of this deck formed the riding surface, special care was given to the placing and finishing of this concrete. The use of hand-drawn Master vibratory screeds 14 and 22 feet long, riding on built-up removable side forms, readily finished concrete with a slump of between 2 and 3 inches to the required surface. After a light floating the surface was broomed. Concrete was then damp-cured for 12 hours, followed by an application of Rite-Cure curing compound. Traffic

was kept off the finished deck for the required period, which necessitated placing the major portion of concrete from the ground.

Substantial ornamental metal bridge railing, set 1 foot 8 inches back from a 9-inch-high curb on a 2-foot 8-inch-wide concrete coping, protects traffic and enhances the streamlined effect of this elevated structure. Roadway lights, together with illuminated directional overhead signs, are provided for the safety and guidance of nighttime traffic. The entire layout is limited access for vehicular traffic only.

Along with the express highway, the Metropolitan Transit Authority for the Boston subway and rapid-transit lines is extending a line from Maverick Square to Day Square with a new stop for the airport. Busses will pick up passengers at that point and transport them to the airport via ramps of the expressway.

Quantities and Personnel

The major items in this first contract for the Boston Express Highway included the following:

Excavation	140,000 cu. yds.
Ordinary borrow	176,000 tons
Cinder fill (ramps)	65,000 cu. yds.
Class A concrete	22,720 cu. yds.
Reinforcing steel	3,381,000 lbs.
Structural steel	16,964,000 lbs.
Cast-in-place concrete piles	70,000 lin. ft.
Steel piles	68,000 lin. ft.
Bituminous concrete pavement	4,000 tons
Bitumen	48,000 gals.
Crushed stone, macadam pavement	8,320 tons

Job personnel for V. Barletta Co. included Charles A. McCallum, General Superintendent; Horace A. DelGrosso, Superintendent; and Frank Venti, Project Manager. For the Harris Structural Steel Co., Edward Lambert was Superintendent and S. W. Murphy was Engineer.

For the Massachusetts Dept. of Public Works, Gordon Gray is Resident

Engineer and E. W. Kumpel is Assistant Resident Engineer. The Department is headed by William F. Callahan, Commissioner, with Philip H. Kittfield, Chief Engineer, and R. O. Spofford Bridge Engineer. The work is being done in District V, headed by Charles A. Fritz, District Engineer. Field engineering forces included K. B. Stensrud in charge of concrete operations and R. E. McCarthy who was Office Engineer on the project.

Allaback Moves Up at Thew

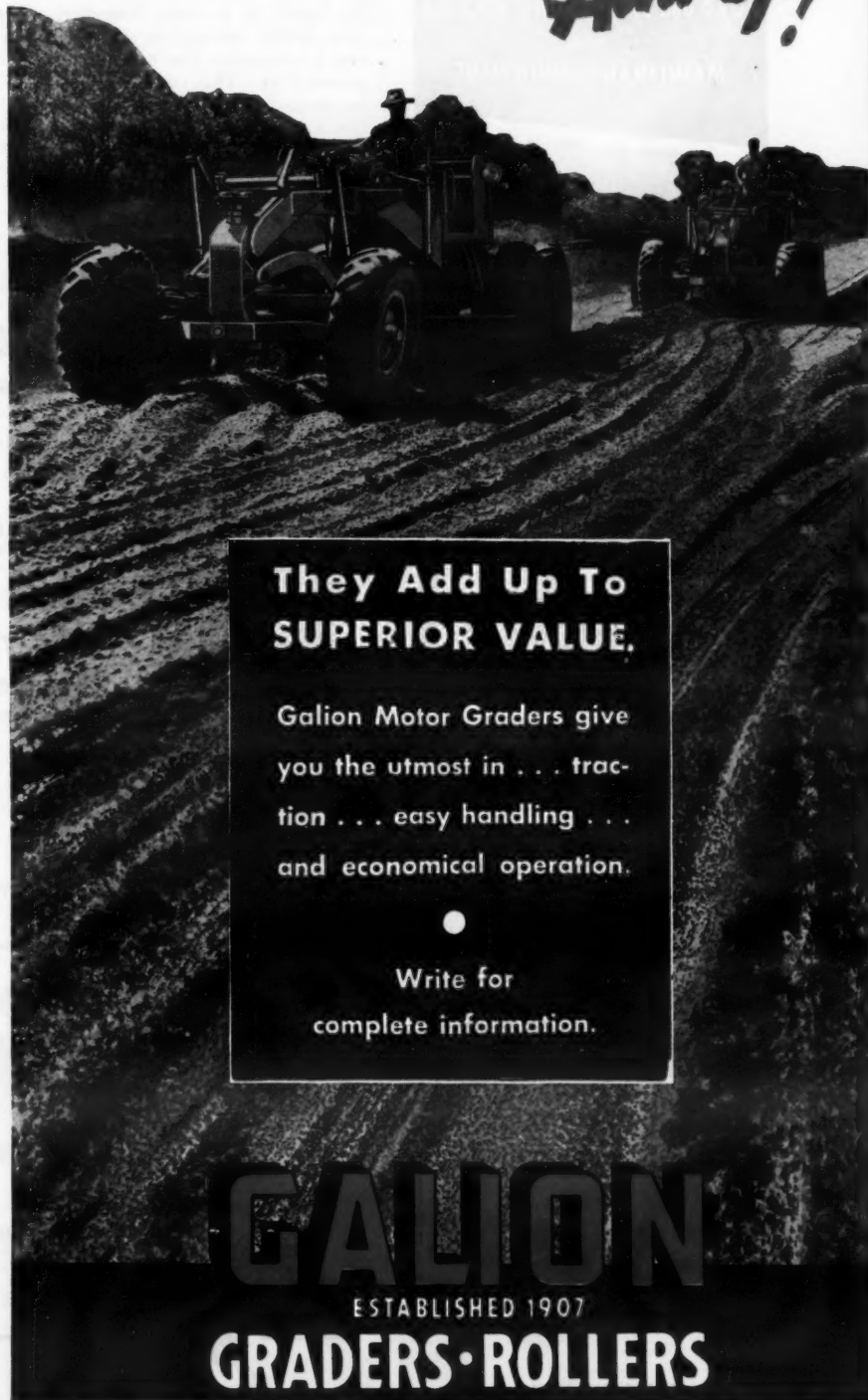
W. J. Allaback, who joined the Thew Shovel Co., Lorain, Ohio, in 1948, as head of the Planning Department for the TL Division, has been made Production Manager of the firm.

Film on Clay-Pipe Making

The story of a venerable industry is brought to life in full color in a new sound movie entitled "Out of the Earth". Filmed at The Robinson Clay Product Co.'s largest plant at Pottstown, Pa., the picture tells of the manufacturing techniques now applied to production of vitrified-clay pipe.

The film is available to engineers, contractors, and building suppliers throughout Robinson's eastern and central marketing territory. Just write to the company at 65 W. State St., Akron 9, Ohio. There is no charge for the film, but to insure availability, requests for the film should be mailed well ahead of the date on which you wish to receive it.

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Prepacked Concrete For New Flood Dam

Concrete Design at Whittier Narrows Spillway Calls for New Type of Concrete Placed by Intrusion Method

† FULLY 18,000 cubic yards of concrete in the new 50,000 cubic-yard Whittier Narrows Dam spillway section will be placed by methods which proved successful on the recent reconstruction of Barker Dam, in Colorado. Whittier Narrows, however, is the latest major flood-control structure to reach the construction stage in southern California, and its designers, the Los Angeles Office of the Corps of Engineers, refer to the method as "prepacked concrete".

Patterned after the Intrusion-Pre-

pakt principle in Cleveland, Ohio—if it does not follow the method exactly—the improved method will justify its added cost by eliminating many construction joints in the spillway. Because of the tendency of a concrete structure divided by many construction joints to shift on tricky ground, the Whittier Narrows spillway had to be made as rigid as possible to hold without movement the counterweighted radial gates, which are also a part of the design.

Thus the wide spillway slab under the bridge pier level, which might ordinarily have called for extensive forming of construction joints, will be placed in only nine blocks. Each will measure 182 x 37 x 8 feet. When the concrete work is completed, the vital spillway slab is not expected to tip or move in such a way as to endanger the free movement of the radial control gates.

Aggregate Placed First

Beyond a bare outline in the specifications, the Corps of Engineers has not yet decided definitely what the exact procedure will be, step by step, in the field. In general, however, aggregate with a maximum size of 6 inches and a minimum size of 1/2 inch will be placed first. This coarse aggregate will be graded and placed carefully in the forms. As it goes in, the steel reinforcing bars will also be placed, along with vertical intrusion pipes placed on 7-foot centers.

Intrusion grout will then be pumped into the pour until it fills all voids completely and reaches a top form which will be used. The intrusion pipes will be withdrawn slowly as the grout fills the voids. The intrusion grout will consist of portland cement, finely divided mineral filler, intrusion aid, fine aggregate or sand, and water. The design of the intrusion grout will aim at a mixture which will penetrate and fill all the voids in the mass.

More than average interest in the new design was in evidence as contractors from all over the southwest stopped in at the Los Angeles office of the Corps of Engineers prior to the call for bids. A pre-bidding conference was also arranged in order to acquaint the contractors with the project as much as possible before the first contract is called for bid.

The dam is to be constructed in stages, with the first-stage contract calling for the spillway structure, and a short portion of the compacted-earth embankment which will make up the bulk of the big barrier.

The Los Angeles Corps of Engineer Office is headed by Colonel W. D. Luplow, District Engineer, and James G. Morgan will direct field construction as Resident Engineer.

We Need More Airports

We have only half the number of airports we need, according to a study made by the Twentieth Century Fund of New York City. At the end of World War II, there were around 3,200 usable airports in the United States. More than 6,300 are considered necessary to meet present air-traffic needs, the study found.

Convention Calendar

June 26-30—ASTM Meeting

Annual Meeting and Ninth Exhibit of Testing Apparatus and Equipment, American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J. C. L. Warwick, Executive Secretary, 1916 Race St., Philadelphia 3, Pa.

July 12-14—ASCE Summer Convention

Summer Convention, American Society of Civil Engineers, Toronto, Canada. Don P. Reynolds, Assistant to the Secretary, 33 W. 39th St., New York 18, N. Y.

Dec. 10-17—Pan American Highway Congress

Fifth Pan American Highway Congress, Lima, Peru. International Road Federation, 550 Washington Bldg., Washington 5, D. C.

German-speaking people of Europe will soon hear in their own tongue how the Pennsylvania Turnpike extensions are being rushed to completion. The "Voice of America" will tell them.

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There's real Savings when you use Warsop Portable Rock Drills and Breakers on all types of construction and demolition work. With Warsop hard-hitting power tools you need no cables, no hose. Compact and light in weight, they are easily transported from job-to-job. Wherever you have breaking or drilling jobs that require only one or two machines figure to use WARSOP. You'll save time, labor and equipment costs.

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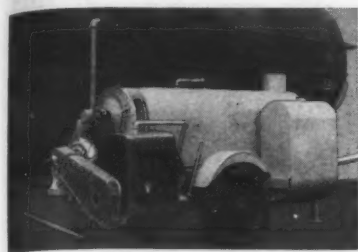
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The Grace Model 50 Rapid Fire heater for asphalt tank cars.

Tank Car Heater Made In New Smaller Size

A new Model 50 Rapid Fire heater for asphalt tanks and tank cars is on the market. Made by the W. E. Grace Mfg. Co., 6003 S. Lamar St., Dallas, Texas, this unit is designed for the contractor or municipal user who does not ordinarily heat or apply more than 10,000 gallons of asphalt in one day. The Model 50 does not have a steam generator for thawing cold asphalt. Equipment for thawing the car or tank by circulating hot oil through the steam coils is available as an extra; it consists of a supply tank or reservoir for the heat-transfer oil, and piping to permit the heater pump and flues to handle the heat-transfer oil. According to the manufacturer, a 10,000-gallon insulated car with good coils can be heated about 25 degrees per hour with the heat-transfer oil, or 40 degrees per hour by direct circulation of the asphalt through the heater, once the asphalt is fluid.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 98.

Electric Generator Is Tractor-Powered

Tractor owners can provide their own emergency electric power with a new type of generator designed for belt drive and producing regular high-line type of electricity. Manufactured by D. W. Onan & Sons, Inc., Minneapolis, Minn., the new Tractor-Drive generator is available in 3,000, 5,000, and 10,000-watt capacities. It supplies the same 115/230-volt 60-cycle alternating current as commercial power lines.

It features a mounted control box, with convenient knockout plugs, containing an ac voltmeter which permits generator speed to be adjusted to correct voltage, and a protective circuit breaker to guard against overloads. It is compact and easy to install, says Onan, and is simple to connect both electrically and mechanically when power outages occur.

The unit is constructed and tested to conform to NEMA standards. Large ball bearings, a heavy steel shaft, an extra-large commutator, and corrosion-resistant brush holders make for sturdiness and generous overload capacity, the company says. Air-intake and exhaust louvers permit cooling air to be drawn through the generator by a centrifugal blower. Drip-proof housings shield the internal parts against water, grit, and dirt. Easily removable covers are designed to simplify inspection and cleaning. Onan suggests its manual line transfer switch as optional equipment.

Further information may be secured from the company by requesting Form A-269. Or use the Request Card at page 16. Circle No. 64.

Goodyear Expands Plant

Last month the Goodyear Tire & Rubber Co. began a \$1,000,000 expansion and improvement program at its St. Marys, Ohio, plant. A new building will house manufacturing facilities, warehousing, and engineering services, for molded and extruded rubber goods. Clemmer Construction Co., of Akron, is the general contractor, and Burger Iron & Steel Co., also of Akron, holds the steel contract.

Rib Pulley Design Prolongs Belt Life

A rib-type tail pulley designed to prolong the life of conveyor and elevator belts has been developed by Sprout, Waldron & Co. of Muncy, Pa. The cone and wing design of the Belt Saver pulley casts aside hard, abrasive materials which may possibly lodge between the belt and pulley surface.

The wings or cones are spaced so as to receive between them all but the largest particles. The foreign material collecting between these ribs is discharged to either side as the pulley rotates. The cone design provides runways for the free discharge of the "dribblings". The company also points out that with this type of construction there is no tendency for sticky or moisture-laden materials to build up on the face of the pulley.

Further information may be secured from the company by requesting Bulletin 35. Or use the Request Card at page 16. Circle No. 22.

Attention

- ARCHITECTS
- CONTRACTORS
- ENGINEERS

For Air-Entrainment PLUS WATERPROOFING, specify COMCO COLLOIDAL PASTE in the concrete mix of foundations, walls, highways, sidewalks, slip-form work, concrete block and pipe, and prevent costly after-construction repairs and waterproofing problems.

COMCO Colloidal Paste thoroughly disperses and holds the concrete aggregate in suspension, keeping the heavier aggregate from settling and 'setting up'. It reduces the water-cement ratio as high as 25%, thereby densifying the concrete and reducing the volume. It eliminates honey-combs and voids that result from poor dispersion and excess water.

COMCO COLLOIDAL PASTE makes concrete plastic and workable—flows like oil around reinforcing and footings. It mixes the concrete thoroughly with a minimum of handling and wear and tear on machinery and equipment.

SPECIFICATIONS: Concrete Materials Corporation COMCO COLLOIDAL PASTE shall be added to the mix in accordance with the manufacturers directions.



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Redi-Mix Men will find it most economical for themselves and the builders.

This material has stood the test of time in the Suez and Panama Canals, the old and new Main Post Office Buildings in Chicago, the Merchandise Mart, etc.

Produce a maximum volume of solid, fine-meshed durable concrete with a minimum of labor. Specify COMCO Colloidal Paste in the mix of all concrete construction.

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500 lb. barrel	\$0.145 lb.
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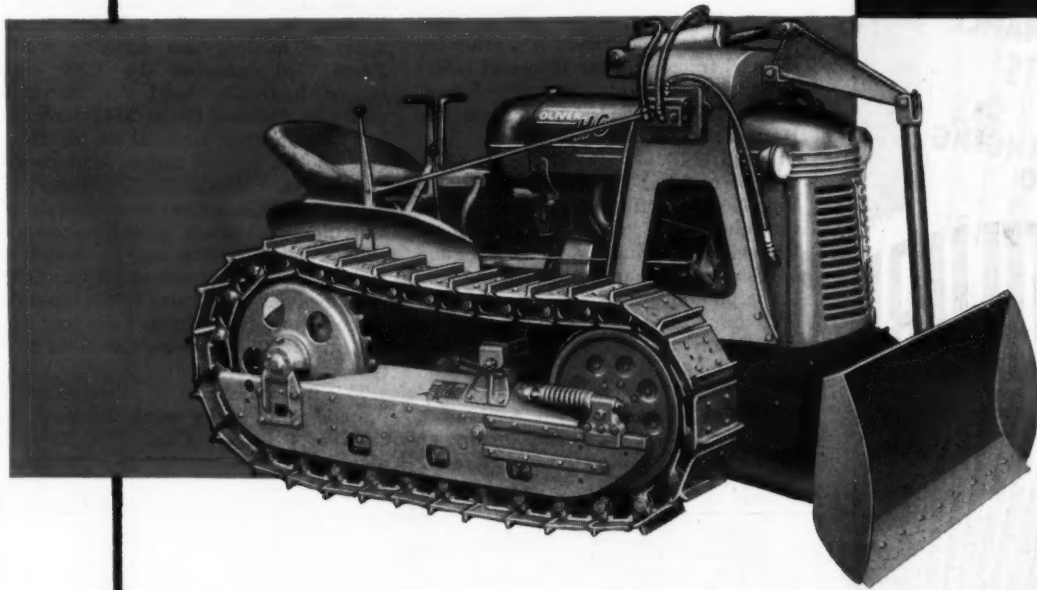
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To handle the extra load and strains of mounted equipment, the main frame, transmission case and drawbar bracket assembly have been materially strengthened. No loads are imposed on final drive spacer casting. Power take-off is heavier . . . stronger.

Front wheels have been increased 50% in

material thickness for longer life. Wheel flanges are on the outside of the track rails for better track alignment. New, heavier type track frame guide supports and buffer springs add strength to handle mounted equipment.

Final drive has been redesigned for greater physical strength and durability.

The NEW OLIVER "HG" Has More Power

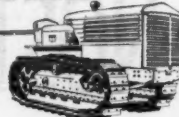
The new "HG" engine gives you more drawbar horsepower . . . extra power to handle bigger loads . . . extra efficiency.

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This Bucyrus-Erie H-2 Hydrocrane is back to earth—or concrete—after a trip by derrick over an addition to the Ohio State University library building. Mellon-Stuart Co. workmen unfasten the wire-rope sling before using the crane to remove the sandstone facing from the old library building.

OSU Library Has Face Removed, Lifted, Reset

Mellon-Stuart Co., of Pittsburgh, Pa. and Columbus, Ohio, contractor for an addition to the Ohio State University library, handled hard-to-reach face stone with a hydraulic crane.

Sandstone blocks had to be removed from the front of the old library and reset on the face of the new building. Construction was well under way when this problem arose, and the work had to be done in cramped quarters; the partly constructed annex adjoined the old building, and outside walls formed a well or areaway between the two. This well was the only place from which the operation could be successfully accomplished.

In order to get its Bucyrus-Erie H-2 Hydrocrane into the well, the contractor fitted it with a wire-rope sling and lifted it over into the well with a large guy derrick on top of the new structure. The crane's light weight made this "Annie-Over" operation a relatively easy one.

Face stone from the old building was removed by the crane and the derrick relayed the blocks to the front of the new structure. Then the derrick made a return trip and hoisted the crane out of the well so it could reset the sandstone facing on the new addition.

The job superintendent said that the operation had been a real time-saver and had eliminated a great deal of hand labor.

Pipe-Laying Operations

Pipe-line construction with the giant new International TD-24 and other industrial tractors of the 12-model International line is featured in a new two-color folder issued by International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.

"International Power for Profitable Pipe-Laying" offers a roundup of on-the-job action shots from spreads throughout the country, with owner and operator performance reported in many of the photo captions. Diesel and gasoline, crawler and wheel models are shown in typical pipe-laying operations. International design, construction, and operating features are described.

This literature, Form No. A-319-NN, may be obtained from the company, or by using the Request Card at page 16. Circle No. 3.



The interior of the 17-mile \$19,000,000 Patapsco-Montebello water tunnel near Baltimore, Md., which Samuel R. Rosoff, Ltd., is building. The Allis-Chalmers HD-5 cleaning up muck left in the tunnel invert is equipped with a special bulldozer blade which fits the tunnel bottom.

Six Equipment Bulletins

Six new bulletins on equipment manufactured by Hercules Steel Products Corp. of Galion, Ohio, have been issued. Form No. 4549 on the Hercules cement spreader explains that this unit is designed to lower costs in laying soil-cement surfaces for streets, roads, airport landing and taxiing strips, truck and dock loading areas, parking lots, etc.

Form No. 2050 describes the features of the Hercules center-lift hoist and a variety of Hercules dump bodies for all types of hauling and dumping work. Form 7550 describes the JDX low-mount hydraulic hoist for standard platform bodies. Form 3549 includes brief descriptive material on all Hercules hoists, special bodies, and special accessories.

Form 1049 describes four models of Hercules split-shaft power take-offs, with complete data on construction features and applications. Form 6050 describes and illustrates the company's tire and tool-pack dump body and the KT and KDT hoists for use with this type of body.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 53 and designate the equipment in which you are interested.

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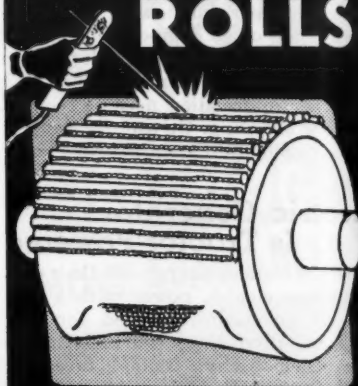
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Georgia Power Co. Builds New Plant

Heavy Foundation of Steel And Concrete for Ultimate Four-Unit Plant; Two Tunnels Connect to River

By WILLIAM H. QUIRK,
Eastern Editor

(Photo on page 1)

ON the east bank of the Chattahoochee River in western Georgia, the new Yates Power Plant is under construction. The Georgia Power Co. started building the big steam plant in October, 1948; and two of the ultimate four units are scheduled for completion this September. The plant is located about 9 miles north of Newnan, Ga., and to the west of State Highway 16 leading to Carrollton.

Units 1 and 2 of the initial installation at the Yates Power Plant will consist of two 100,000-kw turbo-generator units; two 975,000-pounds-per-hour steam generators; together with appropriate accessory and auxiliary facilities and equipment, including coal-handling machinery, condensers, circulating-water system, etc. The approximate cost of these first two units, including plant and equipment, is \$21,000,000.

The prime contractor on the work is the MacDougald Construction Co. of Atlanta, Ga. Its contract with the Georgia Power Co. covers the construction of the powerhouse concrete substructure, concrete floors, roof slabs, turbo-generator foundations, equipment foundations, circulating-water tunnels, circulating-water intake and discharge structures, foundation for substation equipment and structures, tunnels and foundations for coal-handling equipment and structures, track hopper, derrick and hoist-house piers, etc.—or to put it briefly, all the necessary concrete work and incidental structures connected with a powerhouse. Included also in the work were all required excavation, and the construction of a cofferdam along the river at the intake tunnel. Although only two units are in the present work, complete facilities for four units are being built into the plant so that the other two units can be installed at some future date.

Preliminaries

One of the first objectives was to assure transportation to the site, a rolling section of countryside made up of fields and woods. A 30-foot road, 4,000 feet long, was constructed from State Route 16 in to the site. At the start it was just a dirt road on a stone base, but later on it was given a black-top surface. A 2½ mile spur track was also laid to connect the plant site with the

Central of Georgia Railway, which crosses the river to the north. The prime contractor handled the earth work, while Georgia Power Co. forces laid the track. A new railroad freight station known as Yates, Ga., was established on the line to serve the power plant.

The new plant, 250 feet square, is about 400 feet back from the river. Two tunnels, an intake and a discharge, were constructed to bring water from the river to the boiler condensers, and then back again to the river. Built in open cut, the tunnels are twin concrete culverts, each box being 9 feet wide x 10 feet high with walls 2 feet thick. The intake tunnel is 500 feet long, while the discharge tunnel is only 300 feet as it empties into an open ditch which winds back to the river.

Normal river elevation is at 690.0, while the intake structure is at 668.0, the invert grade of the intake tunnel. A sump at elevation 670.5 is the low point in the powerhouse. The final

(Continued on next page)



C. & E. M. Photo

You're looking east into the water-intake tunnel at the Yates Power Plant on the Chattahoochee River, Georgia.

ENGINEERED TYING DEVICES, ANCHORAGES and ACCESSORIES for CONCRETE CONSTRUCTION

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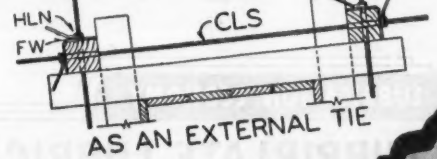
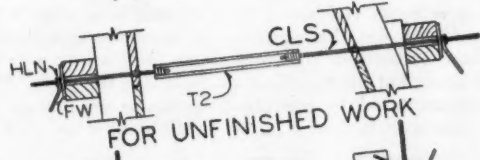
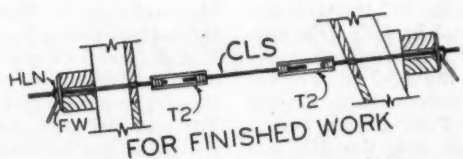
The tough, coarse-threaded Richmond Lagstuds are a versatile supplement to the Tyscru System. Every day in dozens of ways, they'll save time and money on your jobs. Used with Standard Tyscru, they provide a fully adjustable form tying method. They are coupling units for Adjustable Tyscru. Imbedded in a grouted hole or in concrete, they furnish dependable anchorage. With the Handle Lagnut, they substitute for a Tylag. The Richmond Handle Lagnut in all cases replaces a wrench — makes installation and stripping fast and simple. There is no waste when using Richmond Lagstuds; even the pieces left after cutting to length can be salvaged for future use. The threads are really tough and fast.

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RICHMOND KNOW-HOW—DEPENDABILITY—SERVICE—ESTIMATES & JOB PLANNING

Georgia Power Co. Builds New Plant

(Continued from preceding page)

yard grade, or ground level, is 729.0. At one point on the original site a high elevation of 770 existed. These figures indicate that a cut of over 40 feet was necessary to level off the site to yard grade. From there a big hole was dug for the foundation, which in some places reached a depth of 58½ feet.

Circular Cell Cofferdam

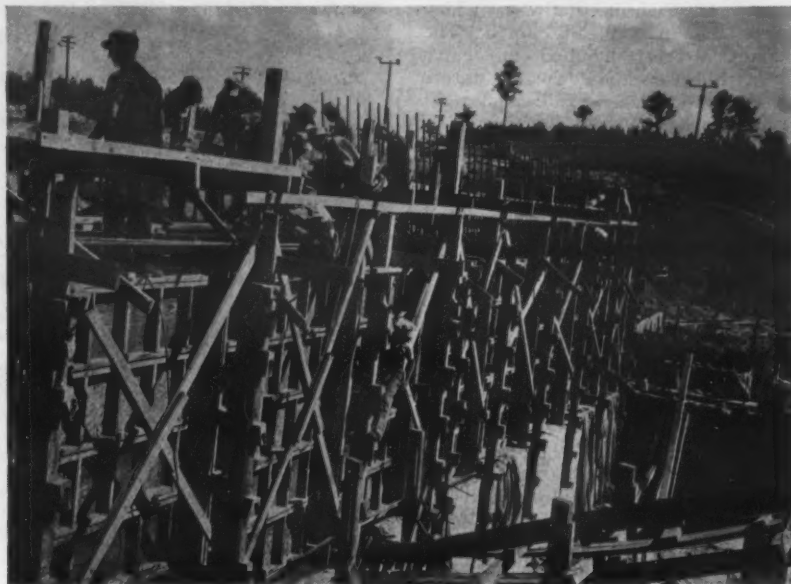
In order to dig an intake tunnel from the river, and to excavate a deep foundation for the powerhouse, both to elevations below river level, it was necessary to construct a durable cofferdam along the river front in front of the intake tunnel. This was done by driving circular steel-sheet-pile cells, interlocking each other, and backfilling them with dirt and rock. The main cells, 11 in number, were 27 feet in diameter. These were linked with interconnecting cells 15 feet in diameter. The cofferdam was built in the river, parallel to the bank, with wings on each end tying in to the shore.

The steel sheeting, in 30-foot lengths, was driven by a 2½-ton drop hammer handled by a Northwest crane with a 70-foot boom. It was driven through the sandy river bottom to rock, and the cells thus formed were filled by a dragline. Elevation of the top of the piling is 705.0, or 15 feet above the normal river flow. No cofferdam was required at the outlet to the discharge tunnel. The trenches for the tunnels were dug, and the material removed was thrown up along the sides of the cut as protecting dikes.

Excavation

In leveling the plant site to yard grade, the overburden was removed by 7 LeTourneau Carryalls—5 at 8 yards pulled by Caterpillar D7 tractors, and 2 at 12 yards pulled by D8's. The material was mostly a sand-clay mixture and was used for the yard fill. For the longer hauls, 6 bottom-dump Euclids were filled by a Thew-Lorain 2-yard shovel. Dirt going into the fills was compacted by sheepfoot rollers.

The hole required for the power-plant foundation measured approximately 310 feet square at the top. Granite rock was encountered in the digging, and was removed in four lifts of



C. & E. M. Photo

Forms go in for the second lift of a wall pour at the Yates Power Plant.

12 feet each. Blast holes were drilled with 3 Joy and 2 Chicago Pneumatic wagon drills using 1¼-inch drill steel and Timken bits from 2-inch down. At the start they were powered by 5 air compressors—3 Chicago Pneumatics at 315 cfm, 1 Joy at 315 cfm, and another Joy at 365 cfm. Later the Georgia Power Co. put up its own compressor house and made it available to the contractor. It was equipped with 2 CP machines—one 15 x 10 compressor at 1,000 cfm, and an 11 x 12 unit at 750 cfm. Both pumped to a receiver.

Drill holes were spaced on average 5-foot centers both ways, and charged with DuPont 60 per cent dynamite. About 50 holes were shot at a time. The excavation was handled by the Thew-Lorain 2-yard shovel already mentioned, and three 80-D Northwest 2½-yard shovels. Hauling was done by the bottom-dump Euclids, 6 end-dump Euclids, and 5 Caterpillar wagons. The discharge tunnel served as a ramp for the equipment digging out the big hole. The material was used to build dikes encircling the building site. The rock in the hole imparted enough stability to keep the side slopes 1 on 1. Seepage and rain water was pumped out of the hole into the river. Progress was steady with the excavation through the 1948-1949 winter so that by February the

first concrete pour was made.

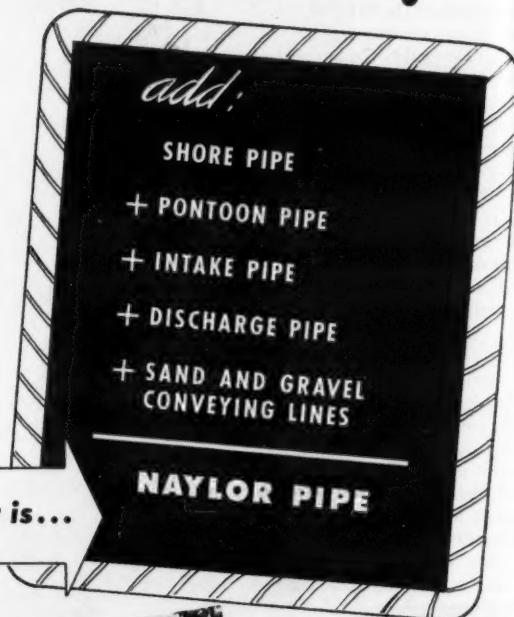
Concrete Batch Plant

In the meantime a concrete batch plant was set up at the northwest corner of the site. Two brands of bulk cement were used—Southern States and Penn Dixie. They were shipped by rail from Rockmart and Clinchfield, Ga., respectively, and unloaded at the plant siding into a Butler 1,000-barrel storage bin. Alongside the cement bin is a Butler 135-yard 3-compartment aggregate bin. Underneath the bin is a platform holding two Rex 28-S stationary concrete mixers. Between the two bins is a high enclosed elevator by which cement from the cars is shunted, via pipes, either into the cement bin or into one of the three compartments in the aggregate bin. When no cars are on the siding and the plant is in use, the cement is moved from the storage bin via worm gear and elevator to the aggregate-bin compartment.

The other two compartments hold
(Continued on next page)

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sand and crushed stone. The sand is supplied by the Georgia Sand & Kaolin Co. of Gaillard, Ga., and the stone by Tyrone Rock Products Co. of Tyrone, Ga. The coarse aggregate is graded from 1½-inch down to No. 4 size. An 820 Lorain crane with a 70-foot boom and a Blaw-Knox 1½-yard clamshell bucket charged the aggregate bins. Water was obtained from three deep wells and stored in a 50,000-gallon tank from which it was tapped to the mixers through a 2½-inch pipe line.

From the bin the cement and aggregate dropped by gravity into the mixers below. The concrete mix design is for 3,000 pounds per square inch when tested after 28 days. The water-cement ratio is 7.1 gallons to a bag of cement. The weights of a typical 1-yard batch are as follows:

Cement	503 lbs.
Sand	1,241 lbs.
Stone	1,933 lbs.
Water	38 gals.

Wooden Forms

About half the plant site, the side nearest the river, is taken up by the turbine room, while the other end is occupied by the boiler room which has a 175-foot brick smoke stack. Both have 5-foot reinforced-concrete foundation slabs, and reinforced-concrete foundation walls. Step wall construction is used. On the river half they vary from 6 to 2½ feet in thickness going up, and on the other side from 3½ to 2½ feet. The floor elevation of the condenser room is 686.5; the boiler-house floor at 692.2; and the main operating floor at 730.0, or one foot above the yard grade. The elevation at the bottom of the turbine-house roof trusses is 788.0, with the finished roof 12 feet higher. The roof consists of precast concrete slabs topped by composition material. A 200-ton overhead crane rides just beneath the trusses.

The boiler-house section is higher. It has eight floor levels, with the roof at elevation 829, or 100 feet above yard grade. Floor slabs average 8 inches in thickness, and the roof is a 6-inch cast-in-place slab with built-up top. Concrete goes up to elevation 730.0; above that the walls are either brick or Johns Manville corrugated asbestos siding. The interior framework is steel.

Concrete forms were built of ¾-inch plywood, cut into 2 x 8-foot panels with the long side laid horizontal. These were backed with 2 x 4 vertical studs on 16-inch centers, and other 2 x 4's across the bottom and top of each panel. The panels were held together with Universal snap ties, two on bottom and two on top. At the ends of the panels further support is obtained with 4 x 6 vertical wales. Above the first lift the bottoms of these wales are anchored in the concrete already poured. Reinforcing steel was furnished by Truscon out of Gadsden, Ala., and set by the Atlanta Steel Erectors of Atlanta, Ga.

Concrete Placing

As the concrete was mixed at the

central plant it was discharged into the hopper of a Rex 180 Pumpcrete machine, and pumped through an 8-inch pipe line which varied in length from 200 to 600 feet. About 90 per cent of the concrete was placed in the forms in this manner, at the same time being vibrated with Mall pneumatic vibrators. The average production was 43 yards per hour. On the wall pours the concrete was built up in lifts with hoppers and elephant-trunk pipe.

The big pours were on the foundation slabs, 22 separate sections averaging 40 x 55 feet. To reach these with concrete, two gin poles were rigged up and guyed to concrete already poured in the walls or slabs. Concrete chutes were swung from the poles like booms, and extended into the central sections of the station. Swivel joints permitted them to reach all portions of the forms with ease.

The largest consecutive pour totaled 753 cubic yards for the 5-foot-thick foundation slab under a turbo-gener-

(Concluded on next page, Col. 2)

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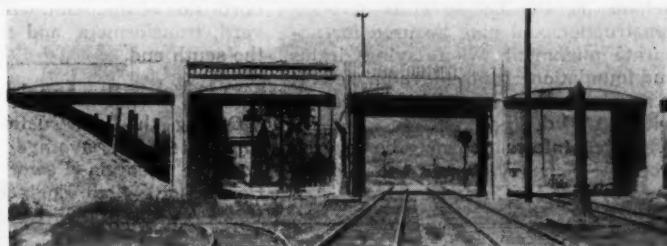


Installation of Bethlehem Reinforcing Bars in bridge deck. The two bridges used 389 tons of bars.

Improving a Highway in Eastern Pennsylvania



Francis C. Wagman (at left), and George A. Wagman, contractors, refer to blueprint in checking progress of job.



One of two new concrete bridges in the relocation project, shown above shortly before completion, carries the two-lane highway over railroad tracks.



Bethlehem Cable Guard Rail, mounted on Bethlehem Steel Posts at bridge approach, affords constant protection to motorists using the new highway.



Crane, rigged with heavy-duty wire rope, prepares to lower boom for new load. Bethlehem Wire Rope has many uses in road construction.

Continuing its highway improvement program, the Pennsylvania Department of Highways recently authorized relocation of 4913 ft of Route 24, near York, Pa. Included in the construction of the new 2-lane road were two reinforced concrete bridges. Contractor: G. A. and F. C. Wagman, Inc., Dallastown, Pa. In addition to structural steel and bridge reinforcing, Bethlehem furnished dowel units, cable guard rail, and steel posts.

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Close quarters are no obstacle to Barco's new tamper, the Pegson Rammer.

Earth-Fill Tamper

A new earth-fill tamper designed to produce a high degree of compaction in restricted areas is made by the Barco Mfg. Co., 1818 Winnemac Ave., Chicago, Ill. Self-contained and portable, the Barco Pegson Rammer may be used for compaction adjacent to structures, foundations, abutments, pipes, and retaining walls. It gives compaction on lifts of 12 to 20 inches, according to the manufacturer, and tamps about 20 to 24 cubic yards of soil per hour. It operates on a modification of the rocket principle, jumping upwards from the thrust of the power cylinder against the "foot" and dropping by its own weight.

Further information may be secured from the company. Or use the Request Card on page 16. Circle No. 93.

Hand Sighting Level

A precision-built hand sighting level 5 inches long is now available from Binoscope Co., P. O. Box 9384, Philadelphia 39, Pa. The level is of brass construction and may be used for accurate alignment when laying drains and foundations, contour grading, etc. It is simple to use and said to be accurate within 1/20 degree.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 113.

Georgia Power Co. Builds New Plant

(Continued from preceding page)

ator unit. A fault was discovered in the rock under the boiler house, so a complete slab was not used at this location. Instead, columns were poured and capped, and then topped with a flat slab. The concrete was cured with burlap and water.

Floor slabs were screeded by hand, then covered with a 1-inch layer of rich grout which was given a trowel finish. Interior columns, averaging 12 x 12 inches, were built with Universal forms. Two Lorain Moto-Cranes and a Bucyrus-Erie 10-B crane handled the pipe and forms during the concreting. Concrete was placed at the rate of 1,400 cubic yards per week. The walls went up in 8-foot lifts on the average.

Structural-Steel Framework

Structural steel for the power plant totaled 1,600 tons, and was furnished by the Steel Construction Co. of Birmingham, Ala. Turbine generators are manufactured at the Schenectady, N. Y., plant of the General Electric Co. The Combustion Engineering Co. of New York City is supplying the boilers which are fabricated at Chattanooga, Tenn. The two condensers come from the Foster-Wheeler Co. of New York. Piling totaling 20,000 linear feet was driven under the switching framework, coal-crushing house, and the masonry smoke stack. Raymond step taper piles were used.

The Georgia Power Co. outfitted the concrete and steel machine shop on the site with the following units among others:

Westinghouse welding machine
Peerless metal saw
Grinders
Cincinnati-Bickford drill press
Gould & Eberhardt 24-inch shaper
Logan lathe, 6-inch swing and 3-foot bed

Other structures on the site include a steel storage shed, an oil house, and the compressor house already mentioned. The coal storage area is at the north side of the plant, while the switch yard, transformers, and towers are at the south end.

Personnel

During the construction, 300 men constituted the average work force. For the Georgia Power Co., James Hanie is Resident Engineer and J. U.

Benziger is Superintendent of Construction. The plant construction is under the general supervision of B. W. Sinclair, Superintendent of Production.

B. L. Cash is Superintendent for the MacDougald Construction Co. The major items in the MacDougald contract include the following:

Earth excavation	768,668 cu. yds.
Hard and soft rock	214,326 cu. yds.
Tunnel excavation	25,000 cu. yds.
Concrete	45,000 cu. yds.
Reinforcing steel	1,900 tons
Miscellaneous iron and steel	260,000 lbs.
Drilling	15,000 lin. ft.
Trowel finish floors	100,000 sq. ft.

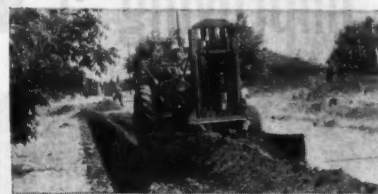
Flexible Tubing Staff News

The Flexible Tubing Corp., Branford, Conn., has promoted Wesley L. Guiles from Development Engineer to Technical Representative. Mr. Guiles recently returned from Alaska where he was Flexible's representative at the U. S. Air Force winter maneuvers. Jack F. Chapin has been appointed Development Engineer in charge of product and process engineering for the company.

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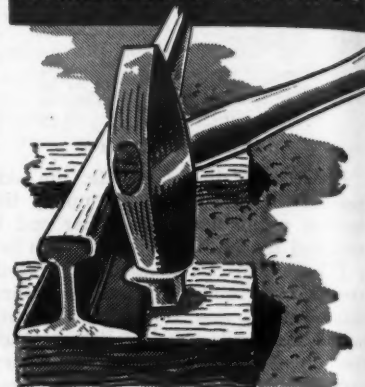


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Spark Plugs, Their Performance, Upkeep

How to Test Them, Choose The Right Type, Analyze Their Deposits, Spot Gas Leaks, Service Them, Etc.

THE spark plug, although a relatively small part of a spark-ignition internal-combustion engine, is far from being an insignificant item. For its size it may well be the most important component because the overall well-being of the engine is critically dependent upon the plug's satisfactory performance. Plug performance today is so superior to that of a few years ago that many users give little thought to that piece of equipment. The spark-plug industry expects to manufacture an estimated 300,000,000 plugs this year, and one manufacturer alone will make over 100 different types.

History

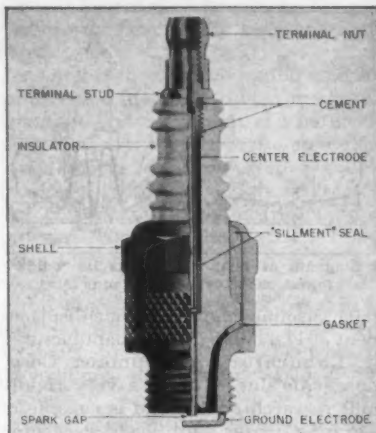
The first "commercially successful" spark-ignition internal-combustion engine was invented by M. Lenoir in 1860. The spark plug used in this engine had electrodes spaced 1/2 inch apart, the spark timing was erratic, and the engine did well to overcome its own friction. While by 1900 replaceable spark plugs, as we know them today, were commonplace, their design and construction left much to be desired. Also, because piston-ring design was still in its infancy,

Editorial Note—This article, reprinted from "Lubrication," was written by G. R. Furman and B. Corrigan, Technical & Research Division, The Texas Co.

engine compression was poor and considerable oil pumping was encountered. Both factors resulted in carbon fouling and oil wetting of spark-plug electrodes, and as a consequence many design variations were introduced during the early part of the century to guard against these deficiencies.

During World War I, aircraft spark plugs with porcelain and mica insulations were commonplace. In automotive practice during the same period, some steatite insulations—so-called because the mineral steatite (soapstone) was substituted for some of the more common porcelain ingredients—were used. Many other insulation materials and basic designs were put forth, mostly unsuccessful yet interesting.

Due to the shortcomings of mica for good spark-plug performance, researchers developed superior ceramics to replace this material. Siemens in Germany introduced sintered aluminum oxide (essentially Al_2O_3 , mined in the natural state as crystalline corundum or synthesized as alumina) in the late 1920's, and since then the ceramic insulator has found widespread use. Corundum is frequently modified with small amounts of other oxides to impart certain particular characteristics such as improved electrical insulating properties, high temperature, strength, etc. Besides small quantities of magnesia and silica, often occurring in the binder, commercially available plug ceramics may also contain various mixtures of



Champion Spark Plug Co. Photo
A cut-away drawing of a typical one-piece automotive spark plug.

boria, beryllia, calcia, zirconia, and/or thorium.

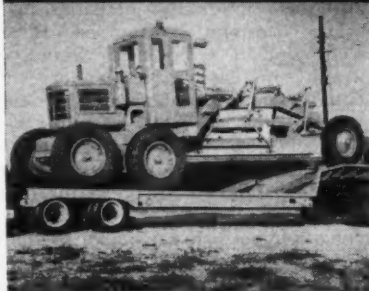
Alumina has very high mechanical strength and high electrical resistance at high temperatures, resists sudden

heat shocks, has excellent heat conductivity of an entirely different order as compared with porcelain, and is resistant to corrosive attacks from lead compounds. Thermal conductivity is an important quality, as it largely determines plug operating temperature; insulators with high thermal conductivity may be made with longer firing ends and, accordingly, longer electrical leakage paths. The superior resistance of alumina to attack by lead compounds is due to its chemically basic character.

Plug nose ceramics were once glazed all over with a coating having a high silica content. The firing end was glazed to retard the adherence of carbon; however, this glaze had to be abandoned on current plugs due to its susceptibility to attack by lead oxides. A glaze is retained on the outer end of the insulator to resist accumulations of moisture, dirt, etc., which can provide a conductive path and encourage flash-over. Being glazed, this part of the plug can easily be wiped clean.

(Continued on next page)

What's Your hauling problem?

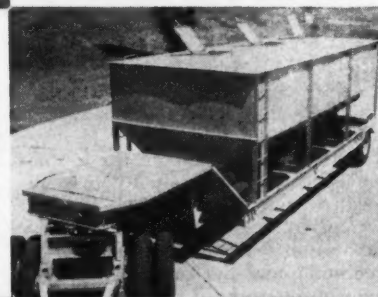


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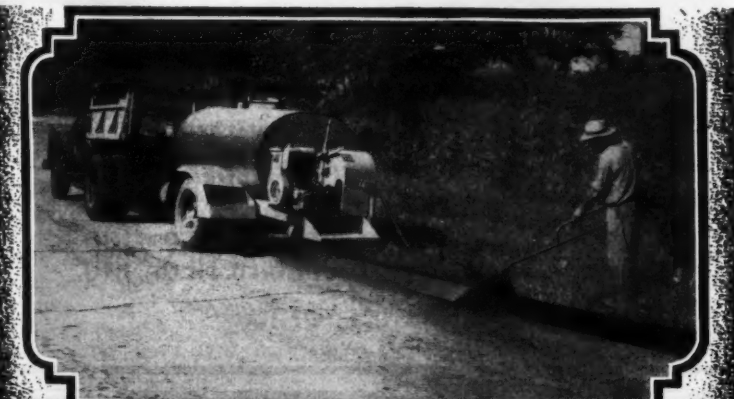
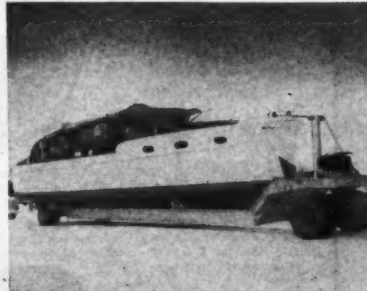
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Spark Plugs, Their Performance, Upkeep

(Continued from preceding page)

Spark-Plug Types

The modern spark plug must perform the same basic function as its progenitor but usually under more trying conditions. Now its size, shape, and location are very carefully considered. Although spark plugs may be very similar in overall appearance, their performance may be widely different as many built-in design features are not externally visible.

Spark plugs are made in a large variety of types and styles as, in many applications, they have to be fitted to a particular kind of engine operation. Briefly, however, they have certain general classifications which include: thread size, ranging from 10 mm to 7/8 inch, shielded or unshielded, the shield protecting against radio interference; thread reach, or length of thread, which depends upon cylinder-head thickness (in general, aluminum heads take a longer-reach plug than a cast-iron head); number and arrangement of ground electrodes; and heat range.

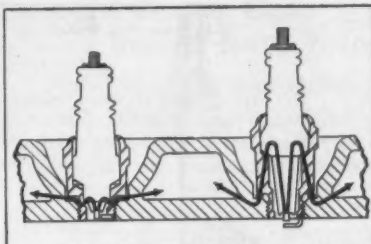
Plugs are made in two basic types of construction: one-piece and two-piece (some three-piece—steel body, center insulator, and coupling nut). The two-piece design had, until recently, definite advantages: it could be disassembled to facilitate cleaning on the job, and when carefully reassembled would be leak-tight. Better sealing techniques have been developed in the last few years, however, so that the modern one-piece plug can be made gas-tight. In certain series of plugs, either one or two-piece construction can be obtained. Although the latter usually is more expensive to purchase, some manufacturers make available replacement parts and overhaul services which enable some operators to realize an overall net savings, despite the higher initial cost. For any one type of operation—aircraft, stationary gas engine, or automotive service, for example—plugs are graded according to their heat range; that is, the optimum operating temperature of the electrodes and core nose.

The difference between a "hot plug" and a "cold plug" is controlled by the structural design; that is, the effective heat path from the center tip to the water jacket (or to the air if it is in an air-cooled engine) is longer for the hot plug than the cold one. The cross-sectional area and thermal conductivity of the ceramic, and the conductivity and amount of exposure of the center electrode, all control the nose temperature so that it is possible to have two plugs of identical outside dimensions and core shape with different heat ratings. Similarly the heat range of a plug may be greatly increased by providing a recessed insulator tip. The section or mass of the annular tip is so small that it tends to follow the temperature cycle of the cylinder, and it attains a temperature high enough at lower engine loads and speeds to inhibit the deposition of oil and the vapors of lead compounds without causing pre-ignition at high engine output.

Plug Testing

The determination of pre-ignition temperature may be accomplished by various means. Perhaps the most interesting is the use, in a test engine, of specially made thermocouple spark plugs which have a fine thermocouple located in or near the center electrode tip. Although these are purely research tools, data obtained by them are invaluable in the design of future plugs and engines. With a very careful placement of the fine thermocouple lead wires, their presence has no appreciable effect upon the heat rating of the plug.

The best laboratory means of rating peak plug performance so far developed is in a special overhead-valve one-cyl-



A diagram of heat flow paths in "cold" and "hot"-type spark plugs.

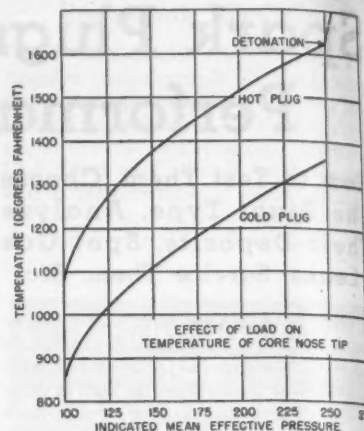
inder gasoline engine having a displacement of 17.6 cubic inches, manufactured by Laboratory Equipment Corp., Mooreville, Ind. This is a very rigidly built research engine and is capable of operating under unit loads exceeding those developed by any commercial engine. To rate a plug installed in this engine, the power output is increased by raising the supercharge until a load is reached at which the plug goes into pre-ignition. The maximum engine output without pre-ignition, expressed as Indicated Mean Effective Pressure (indicated mean effective pressure is the average pressure throughout the engine stroke, required to produce the observed indicated horsepower) is the IMEP rating of the plug; the higher the rating, the hotter the plug can operate without pre-ignition.

The accompanying graph shows comparative data obtained in a 17.6 engine using specially constructed hot and cold-type plugs with a thermocouple embedded in each insulator tip. Notice for the hot plug that, as the load (IMEP) was increased, the plug temperature also gradually increased up to where pre-ignition occurred. Beyond that point, the temperature would very rapidly increase in a manner which could soon bring about destruction of normal plugs and other engine parts. The cold plug, when operated over the same load range, also increased in temperature; however, even at the maximum load imposed, it remained cool enough to perform satisfactorily at high output. Note that the cold plug is also considerably cooler at the light-load condition and, if the load were to be decreased further, a condition might occur where that plug would be too cold, and cold fouling might occur; this would not take place with the hot plug under similar light-load conditions.

Electrodes

Although platinum is reported to

have been used for spark-plug electrodes as early as 1895, electrodes for the past thirty years have almost all been made of nickel or some nickel alloy. The popularity of nickel for many years attests to the judicious selection of this material. The particular alloy varies from one plug manufacturer to the next by incorporating small amounts of other metals (chromium, barium, manganese, columbium, silicon) which enhance certain characteristics of the nickel. These alloying ingredients provide, in an economical design, maximum resistance to deterioration under the electrical discharge, and a reduction in the voltage necessary to produce a spark at the gap; they also reduce attack in the presence of heat and chemical reactions resulting from the combustion process. Due to the large number of controlling variables in electrode design, data obtained by various investigators frequently are contradictory, and the "best electrode" is a subject of considerable controversy.



Although more costly, the fine-wire platinum type has excellent corrosion resistance and, due to the smaller size, produces a more exposed spark. Furthermore, a lower sparking potential

(Continued on next page)

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may result, probably enhanced by the sharper edges of the fine-wire design. Fine wires have a lower heat retention and can be heated and cooled more rapidly, tending to follow the thermal fluctuations of the combustion cycle.

Plug Deposits

Analysis in a chemical laboratory of the encrustments scraped from the firing end of a spark plug can tell something of the overall engine behavior, although simpler means usually are available. Nevertheless, a typical analysis may show traces of metals such as iron, aluminum, copper, tin, etc., as engine wear progresses; silica and other minerals drawn into the engine as dust through the carburetor; carbonaceous material from the combustion of gasoline and decomposition of oil; metals and mineral oxides resulting from the additives (if any) in the decomposition of the lubricant; and lead in the form of oxides, chlorides, bromides, sulphates, and combinations thereof. With average road dust and usual engine wear conditions, these sources of plug contamination are low; deposits are essentially carbon (soot) and lead compounds. For engines operating on fuels containing no tetraethyl lead, carbon usually predominates, but cases have been reported of hot-running plugs on which heavy mineral deposits were almost entirely due to decomposition of the additives in the crankcase oils.

As deposits control the spark plug's appearance to a great extent, acquaintance with the behavior and formation of various deposits usually permits the type of operation to be deduced from a visual inspection of the plug.

Satisfactory operation usually produces a smooth light-brown core nose with, perhaps, a light, fluffy dry soot on the body which can be readily wiped off with a cloth. With unleaded petroleum fuels, the brown coloration may be due to iron compounds resulting from cylinder wear or drawn in through the carburetor as dust. The electrodes should be grey. Tetraethyl lead fluid in the gasoline may cause a greyish-yellow to brown powdery deposit on the insulator and electrodes.

Cold plug operation is usually indicated by soot deposits on the insulator and plug body which may originate from either the fuel or lubricant. A soft, fluffy carbon deposit frequently identifies fuel soot resulting from incomplete combustion. While the use of too cold a plug may be the cause, other factors such as low engine operating temperatures, worn compression rings, unsatisfactory valve performance, or overly rich mixtures caused by improper carburetion or poor choke efficiency may be responsible. All mechanical factors should be checked, as it cannot be expected that by going to a hotter plug 100 per cent combustion efficiency will result. Even a plug of ideal heat range might be found coated with soot if it were checked immediately after a period of sustained idling during which normal operating temperature was not reached. To overcome this discrepancy, a plug should be checked immediately after a normal run.

Fouling from oil pumping produces a hard, shiny, sometimes wet deposit on the entire firing end of the plug. Oil remaining on the plug slowly carbonizes, becomes dry, and when sufficient in amount the carbon fouling on the insulator can make a conductive path to ground, to entirely short-out the plug, or produce sporadic misfire. In this case, improved oil-consumption control is obviously desirable. A temporary alternative would be a hotter plug to maintain the core nose and electrodes above the oxidation temperature of carbon.

Too hot operation may be evidenced by a dry, white, or light-tan insulator while the electrodes reveal burning. The core nose may be chipped, cracked, or blistered. With leaded fuels, the core

nose may be covered with a dark, shiny deposit, sometimes in the form of yellow-brown to black glossy beads. A shiny appearance may signify that the ceramic temperature was so great that the deposit of lead compounds melted, forming a fluid slag.

A mild condition of hot operation in automotive equipment with leaded gasoline may show no ceramic cracking, electrode erosion only to a slight extent, with a light-colored dry or powdery deposit. Such a deposit, in itself, does not impair the sparking efficiency of the plug as much as it would seem. Its effect becomes appreciable only when complicated by still higher operating temperatures which could cause the deposits to melt and to become increasingly conductive to electricity, or by a sub-

sequent excess of carbonaceous deposit, such as that caused by an inoperative choke.

At first glance, enriching the mixture with leaded fuels would appear to contribute a greater amount of lead products; however, this is not the case. The total amount of combustion products passing through the engine is greater, but the amount deposited normally is reduced. The controlling factor is in the oxidizing conditions existent in the combustion chamber; at lean-mixture ratios there is an excess of oxygen. In such oxidizing atmosphere there is a tendency to form lead oxide; whereas in making the mixture richer, the amount of excess oxygen is reduced, thereby promoting the formation of the halide which is considerably more vola-

tile than the oxide and, therefore, more readily volatilized out of the system.

Plug Performance

For best performance the plug must operate within its designed heat range and be properly seated on the gasket. If spark plugs are of the wrong type or are inefficient, the compressed gas may burn in a sluggish manner. This may result in incomplete combustion with only part of the fuel being converted into power, the balance going out the exhaust in the form of unburned gas or past the piston rings to contaminate the crankcase oil.

Certain engine or operating malfunctionings can exist which, at times, may cause the proper spark plug to be er-

(Continued on next page)

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Spark Plugs, Their Performance, Upkeep

(Continued from preceding page)

roniously blamed for the trouble. The most common complaints are pinging, missing, or sluggish performance, and poor idling. Excessive spark advance or the use of gasoline with too low an octane number for the application may cause pinging due to detonation. This is usually most noticeable at low-speed high-load operation such as accelerating up a hill.

Missing or sluggish performance may be due to many causes. These are, primarily: improperly adjusted spark gap, retarded spark, lean mixture, and malfunctioning in the electrical system. Missing at low-speed acceleration sometimes is due to a defective accelerating pump in the carburetor. Poor idling can be caused by poor valve seating, improper carburetion, and plugged air filters.

It is a well known maxim that a hot plug should be used in a cold engine, and a cold plug in a hot engine, but how hot or how cold a plug can be and perform satisfactorily depends upon the operating conditions involved. When a plug is too cold, carbon deposits form. It has been shown by several investigators that carbon will not remain on a surface heated above approximately 650 degrees F in oxidizing atmosphere. It therefore is desirable that the parts of the plug exposed to the combustion process be maintained above that temperature to keep carbon deposits at a minimum.

The absolute maximum plug temperature is limited by pre-ignition, which is the uncontrolled ignition of the fuel-air mixture by the insulator tip or electrodes (or deposits thereon) heated to incandescence by combustion with ignition occurring before the accurately timed spark discharge. Any other part in the combustion chamber, e.g., exhaust valve, or deposits on the piston crown, will also cause pre-ignition if heated to a sufficient temperature.

The temperature at which an incandescent source will ignite the fuel-air mixture will depend upon many variables including nature of the fuel, mixture strength and pressure, and area and catalytic effect of the electrodes and heated surfaces, as well as any deposits which may be present in the combustion chamber. For a generalization, however, the temperature to induce pre-ignition is of the order of 1,700-2,000 degrees F.

From the afore-mentioned limits, it can be seen that plug temperature should lie between 650 and 1,700 degrees F. At the higher operating temperatures, even before pre-ignition occurs, other factors become increasingly more important in limiting the operation, and in some cases may greatly reduce plug life. With the use of leaded fuels, electrode erosion and corrosion both increase with temperature; a plug that runs too hot tends to burn the points. Chipping, cracking, or corrosion of the ceramic core nose also can occur. Optimum plug life, commensurate with peak performance, is reflected in the plug's ability to operate cool enough at high loads (and, accordingly, high temperatures) without causing pre-ignition

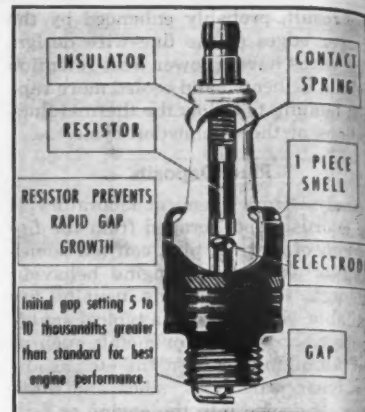
or abnormal electrode or ceramic deterioration. In the very same installation, however, the plug must run hot enough to resist cold fouling or sooting under idling conditions.

Hotter operation seems to tend towards lessening deposits from fuels containing large amounts of tetraethyl lead. Plug design helps in this respect but is not the overall remedy for keeping deposit build-up to a minimum.

When the installed plug is the type recommended by the engine manufacturer, and its appearance is indicative of over-heating, it may reveal gas leakage or improper seating of the plug due to the condition of the spark-plug gasket. The metallic gasket should be evenly compressed; if not compressed it will leak and interrupt heat flow to the water jacket. If flattened from previous over-tightening, it lacks resilience to sealing. An uneven color may indicate blow-by. In any case, if the gasket condition is at all questionable, it should be replaced.

Electrode burning, while a function of center electrode temperature, is also influenced by the nature of the electrical discharge, which in a conventional automotive ignition system is believed to consist of two different components: (1) the initial discharge which is controlled by the capacitance and resistance of the gap circuit; and (2) the subsequent decay of energy which is stored in the inductive fields of the ignition system. The initial discharge is a high-amperage unidirectional current discharge of short duration, and the remainder is a characteristic logarithmic decay of voltage considerably longer in duration, the initial stages of which are usually oscillatory in nature.

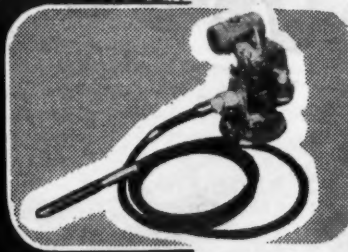
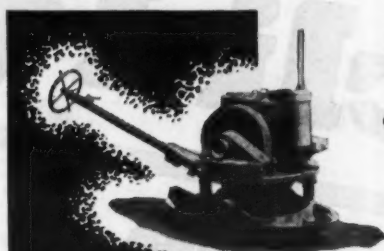
The initial spark ignites the fuel charge; the second portion, an "inductive discharge", is the result of energy inductively stored in the primary and secondary circuits and generally serves no purpose other than to burn the electrodes, as combustion is already underway. Some investigations, however, in-



Electric Auto-Lite Co. Photo
Some spark plugs overcome electrode burning by incorporating a resistor within the plug body.

dicating the secondary discharge may have some effect upon the firing of extremely lean mixtures.

(Continued on next page)



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Some plug designs overcome electrode burning by incorporating within the plug body a resistor which, although it has small effect upon the initial spark in the combustion chamber, does reduce the amperage level flowing through the discharge path, resulting in less heating of the electrode metal (at the strike point) with less metal sputtering and a subsequent increase in electrode life. The use of relatively large resistance values materially aids in reducing radio interference.

At high temperatures, lead deposits are relatively good electrical conductors and, when a condition exists where glassy core nose deposits are formed, missing or complete shorting-out can be expected. Even though a plug is heavily encrusted, an electrical check at room temperature may make the plug fire, while upon heating to 1,200 degrees F, for example, the electrical resistance of the fouling media is so reduced that the plug shorts-out. This is a special case, however. The usual carbonaceous deposits on automotive spark plugs are not so "temperature-sensitive"; cold checking may be adequate.

Spark-Plug Location

The location of the spark plug in the combustion chamber has a great effect upon the performance of the engine. As the location is fixed in existing engines it is of no concern to the average user; to the engine designer, however, it is of considerable importance.

For high-power performance a short but controlled burning time for the fuel is necessary, requiring a short flame travel. This can be accomplished by placing the plug as nearly as possible in the center of a combustion chamber which approaches a sphere in shape. This condition is reasonably satisfied in the hemispherical aircraft cylinder head where, by using two plugs, two flame sources are initiated which burn towards each other.

For good idling and high-speed performance, a plug location near the intake valve is preferred, a location where there is a good combustible mixture regardless of stratification or dilution with burnt gases from the previous charge.

To minimize detonation, a plug location near the exhaust valve is advisable, which is usually the hottest region. This site is selected so that the flame front can advance into the cooler region of the combustion chamber. The pressure and temperature of the unburned

charge increases during combustion, but the temperature increase would be considerably greater if compressed against a hot exhaust valve than against a cooler surface and, in the former case, detonation may result. To accommodate all these conditions, a compromise position between the intake and exhaust valves is frequently selected.

Gas Leakage

Under most types of operation modern plugs are very tight as far as internal gas leakage is concerned. Plug designs that can be disassembled may show leakage after overhaul if the sealing gasket was defective or not properly seated. A cracked insulator also may show leakage, as will a plug with a defective seal between the center electrode and the ceramic, or between the ceramic and steel shell. The effect of nominal leakage is negligible insofar as loss of compression pressure is concerned, but is of great importance in that it can alter the operating characteristics of the plug itself. Leakage carries hot gases, fuel soot, combustion residue, etc., up through the plug body and makes it operate hotter than designed. Fuel soot and deposits in the leakage path within the body may cause misfiring by forming a conductive track to ground.

Gas leakage in some plugs is revealed by a vertical, streaky sooting of the external, glazed insulator. When the insulator is generally dirty, however, care must be taken not to mistake a clean ring on the insulator just above the shell crimp to indicate gas leakage, because the high dielectric strength of certain ceramics can cause a corona discharge to char the dirt from that area. Leakage can be determined by a standard spark-plug tester or by screwing the plug into an adapter, immersing in water or kerosene, and applying air pressure. Bubbles immediately indicate a leak.

Small Two-Cycle Engines

Small two-cycle gasoline engines, such as those used to power lawn mowers and small generators, have a characteristic type of operation which requires special spark-plug treatment. As these engines are lubricated by mixing the oil with the gasoline, a large proportion of oil finds its way into the combustion chamber and onto the plug. This necessitates careful selection of lubricant and fuel to minimize combustion-

chamber deposits, for without that selection, the best of spark plugs will not perform satisfactorily. Highly refined oils with low carbon-forming tendencies are preferred. Certain residual oils and some additive-type oils generally leave more ash and deposit or carbon than distillate mineral oils or blends of distillate and well refined residual-type oils. Some additive oils, however, do make cleaner-running engines. There-

fore no blanket statement can be made on the effect of base stocks or additives; too much depends upon the specific components. White gasoline (unleaded) usually would be preferred for cleanest operation, but there are times when the load conditions and temperature are such that leaded gasoline runs with less overall deposit. (The mechanism by which leaded-fuel combustion alleviates

(Continued on next page)

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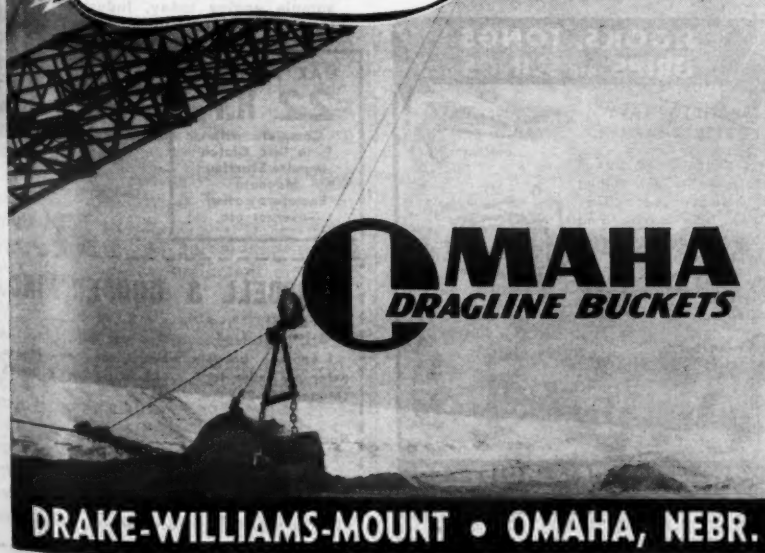
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Spark Plugs, Their Performance, Upkeep

(Continued from preceding page)

carbon deposits in two-cycle engines is not well understood. Some believe it due to a chemical interaction between the two; others hold that the impact of the lead compounds against the combustion-chamber walls knocks off the carbon.)

When purchase of the necessary stocks must be made at the nearest service station, there are times when proper selection cannot be made; the best fuel and lubricant for automotive service may not necessarily be the best for two-cycle operation. The fuel is likely to contain appreciable amounts of tetraethyl lead, with one or more ash-forming additives in the lubricant. In this case, depending upon the type of service—light or heavy-duty—different characteristic failure patterns may be expected for an extended operation. Light running, especially at time of

starting, may lead to oil coking, causing plugs to misfire. Burning of the oil-laden fuel will create large amounts of soot. To accommodate this excessive sooting tendency, a plug operating hot enough to oxidize the carbon is required with a lean carburetor adjustment. When properly selected, a dry, clean plug, chocolate-brown in appearance, can be expected.

For high-load steady-running service such as driving farm equipment, pumps, generators, etc., for sustained periods, sooting is relatively unimportant. Plugs, though, may encounter electrode erosion, and shorting-out caused by a whisker-like deposit build-up bridging the electrodes. Accumulations of electro-conductive deposits on the electrodes can reduce the effective gap length and, due to the inherent construction of many flywheel-type magnetos, especially those in outboard marine engines, decreasing the plug gap length can over-advance the spark by as much as 50 degrees creating a situation akin to pre-ignition which may re-



Fused lead deposits on a ceramic nose look like this.

sult in complete engine failure.

This unwanted early spark is believed due to the condition where, with a nearly closed spark gap, the residual electrical energy in the system is sufficient to produce an additional spark at the plug gap when the interrupter closes, i.e., "makes", rather than when it "breaks", at the designated timing point.

Tendencies towards electrode bridging can be counteracted to some extent by using a plug in which the end of the side electrode comes only to the center line of the center electrode, rather than totally covering it as is commonly done in automotive practice. With the off-set electrode, there is less masking of the spark by the electrode and less electrode surface is exposed for deposit accumulation. Furthermore, there is more opportunity for turbulence in the combustion chamber to keep the gap clean.

Oil Engines

Spark plugs are used in certain types of small-size high-speed diesel engines to provide easy starting, especially in cold weather when the cranking effort is very severe on storage batteries. Such engines are so constructed that they can be temporarily converted from a normal high-compression diesel engine into a gasoline engine with carburetor, spark ignition, and low compression. As the carburetor, manifold, and ignition systems are designed specifically for starting only, this type of engine usually starts more easily than a regular gasoline engine of comparable size where power and economy are of major importance. Once running, the engine can be switched over to full diesel operation; the "gasoline part" of the combustion chamber (containing the spark plug) is sealed off by a poppet valve.

Oil engines of the Hesselman type require a spark for controlled ignition. Such engines are frequently found in farm tractors, contractors' machinery, and road-patrol services where steady, high loads for long intervals are common. Tractor fuel or diesel fuel is in-

jected directly into the cylinder (same as for diesel operation) where, from the heat of compression, it partially vaporizes. Combustion is initiated by the spark plug, usually at 10 to 12 degrees before top dead center. To provide easier starting, gasoline is frequently injected into the intake manifold from a hand primer.

As a portion of the spray from the injected oil inadvertently wets the electrodes, a special, hot-running spark-plug design is required, otherwise extreme sooting would result. Some styles are two-piece construction with a glazed insulator to facilitate on-the-job cleaning. The same type of plug which operates satisfactorily in the gasoline-starting diesel usually will perform well in the Hesselman type. However, a typical oil-engine or "diesel-type" plug, because of the electrode arrangement, operates considerably hotter than conventional automotive types. Due to its heat range and physical dimensions, it cannot be used in gasoline engines.

(Concluded on next page)

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It consists of a manually guided, electric vibratory paving machine and portable power plant and will place upward of 65 cu. yds. of stiff mix concrete per hour; will undercut at side forms and curbs; strike off to crown (both regular and inverted); roll back for second passes. Works right up to and around sewers, manholes and other obstructions. Quickly adaptable to any slab width from 6' up to any practical width. Has strong tendency to propel itself. Operators work from front, side or rear. Power Plant generates both single and 3-phase 60 cycle AC and may also be used for lights and operating other contractor's tools. Write for complete details.*

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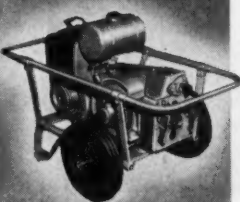
This machine can be used to tremendous advantage in compacting granular backfill under factory floors, in trenches, bridge approaches, close to bridge abutments, alongside foundations, under footings, ramps, sidewalks, municipal pavements, loading docks; in compacting such granular soil as is used in earth fill dam construction and many other places. Delivers up to 4500 1/2-ton vibratory blows per minute. Propels itself at 6' to 8' per min. One man can guide two units side by side. The Jackson M-1 Power Plant will operate two of these machines simultaneously. Complete details on request.*

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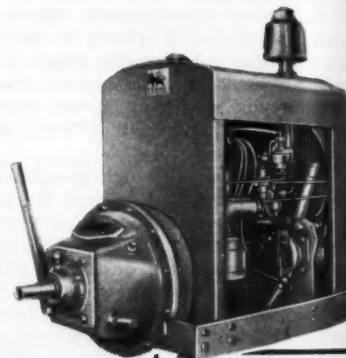


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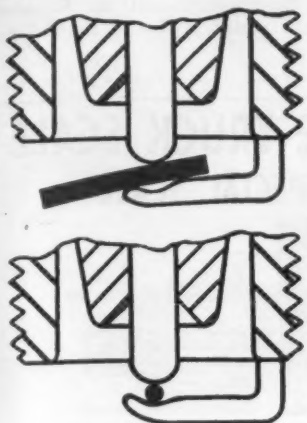
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In spark-plug servicing, a round rather than a flat feeler gage is best for gaging the electrode gap width. The flat gage, by improperly fitting the gap, gives a faulty measurement.

Natural-Gas Engines

Heavy-duty slow-speed engines burning either natural or artificial gas require a special plug capable of exceptionally long life, as it is not unusual for large units in central power-generation and pumping service to run a year or more without interruption. Due to the inherent characteristics of natural gas which averages 60 to 90 per cent or more methane, depending upon the source, some investigators report that substantially more energy is required for ignition than for other heavier hydro-carbon fuels of higher molecular weight, e.g., gasoline or diesel fuel. The higher energy requirement would necessitate a fatter, hotter spark and, as such electrical characteristics would rapidly burn normal electrodes, a gas-engine spark plug may have a large sparking surface. Some natural-gas engines must also operate on raw gas containing appreciable amounts of sulphur. During combustion, "sour" gas, as it is known, forms sulphurous acids which have a corrosive action on most engine parts including the plug electrodes. For such applications, the chemically inert nature of the platinum-electrode plugs have been well suited.

Spark-Plug Servicing

For maintaining peak plug performance, periodic inspections and checking are necessary. Spark-plug cleaners marketed by the various plug manufacturers, in general, clean the firing ends by impingement of fine, dry, abrasive particles in a high-pressure air jet. Usually 5 to 10 seconds of "sand blast" are sufficient. Prolonged blasting wears away the electrodes and insulator; this affects heat characteristics. Lumps of hard carbon deposits can be easily removed from the steel shell with a wire brush or sharp knife. Care must be taken not to scrape the ceramic insulator with any metal such as a knife blade because the abrasive surface of the insulator can pick up a minute amount of metal, leaving a conducting track on the surface. Although scraping the center insulators is not so bad when they are glazed and smooth, the unglazed ceramics can pick up sufficient steel to cause misfire.

If the plugs are oily or wet, they should be first dried by a rinse in naphtha and an air jet before blasting, because if wet, the abrasive granules will clog and do an inefficient cleaning job.

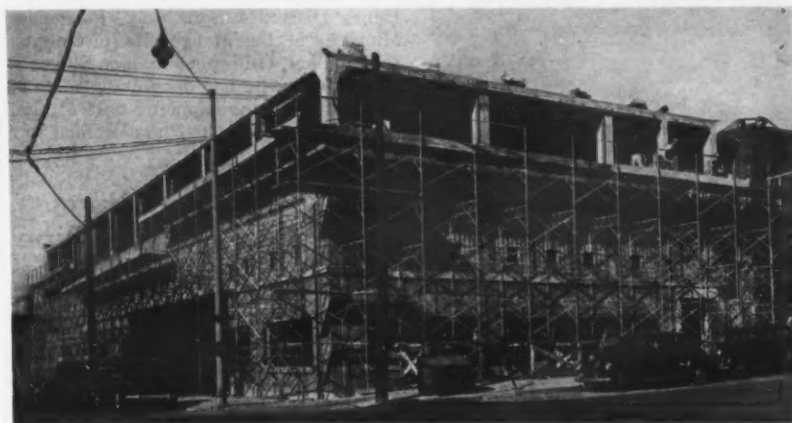
When the deposits are all removed, the gap should be reset, according to the manufacturer's specifications, by bending only the outside, ground electrode. During the adjustment of the side electrode, care must be taken not to accidentally apply any pressure against the center electrode, nor to attempt to adjust the gap by bending the center electrode, as any strains may induce crack-

ing of the insulator tip.

Gaging the gap width is best accomplished with a round wire feeler gage, rather than a flat gage. Worn electrodes frequently will be set too wide if a flat feeler gage is used, although flat-dressed points are not affected. An accompanying illustration shows how a round wire gage accurately checks the gap whereas a flat gage, by improperly fitting the gap, gives a faulty measurement. In the illustration, the gap actually measures a 50 per cent greater opening than the flat gage indicates.

Impregnated Salt Tablets

A circular describing impregnated salt tablets designed to increase worker efficiency during the summer months has been prepared by the United States Safety Service Co., 1215 McGee St., Kansas City 6, Mo. It explains that Pep-Up salt tablets are impregnated with a substance which forms a complete coating around each grain of salt to give a



W. W. Oeflein, contractor on the \$375,000 Cutler-Hammer Building in Milwaukee, Wis., used about 250 Trouble Saver section frames, 5 x 5 feet, for brickwork scaffolding.

slow dissolving action and eliminate digestive disorders. The controlled dissolving gives enough salt for immediate body-salt replacement, but not so much as to cause nausea. The tablets are

available in expendable dispensers.

This literature on Pep Up salt tablets may be obtained from the company, or by using the Request Card at page 16. Circle No. 95.

THURMAN *Portable* TRUCK SCALE

• CAPACITY
18, 20, 25 & 30 TON

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18, 22 & 30 FEET



THE THURMAN PORTABLE TRUCK SCALE can be moved from job to job by removing 6 nuts which hold side arms in place. The rest of the scale can be lifted as a unit. Scale can be moved and readied for use in a few minutes as no adjustments are necessary.

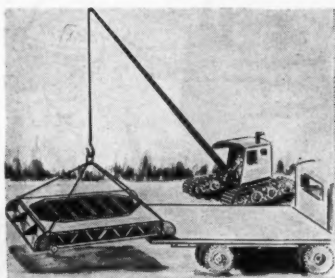
EXTRA LARGE STEEL BASES support the scale, thus requiring no concrete footings. Scale furnished with Chrome-plated weighbeam—other vital parts are electro-plated to prevent rust and corrosion. Immediate Shipment.

Ask for information on other types including wheelbarrow scales, batching scales, and pit-type truck scales.

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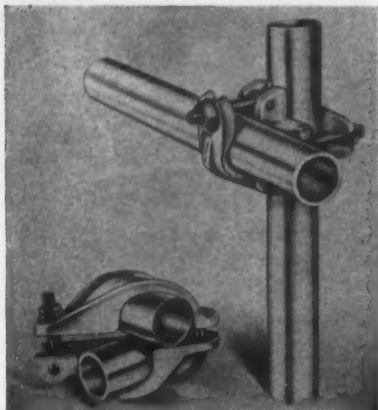
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Acrow's new line of aluminum-alloy scaffold clamps and pipe is known as Acrominum. Two of the four kinds of clamps are shown here.

New Scaffolding Is Made of Aluminum

A lightweight aluminum-alloy scaffold clamp and pipe known as Acrominum has been announced by Acrow Inc., 420 Lexington Ave., New York, N. Y. The line comprises four different types of clamps with a load capacity at least equal to that of steel.

These lightweight clamps, it is claimed, reduce the cost of scaffold erection and transportation. The material is rustless and has great recovery to original condition if distorted.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 97.

Heads Chain-Saw Sales

On May 1, William P. Gillespie took over as Manager of chain-saw sales for

Henry Disston & Sons, Inc. Formerly Manager of the Market Requirements Department, Gillespie succeeds Ellwood J. Gebhart, who has been assigned to a research and development post at the company's factory in Philadelphia.

New Quick Coupling For a 6-Inch Pipe

A quick-disconnect coupling in a 6-inch pipe size for heavy-duty application has been developed by Roylyn, Inc., 718 W. Wilson Ave., Glendale 3, Calif. Known as the 1700 Series, it is designed for fast connecting and fast feeding, and it can be operated without tools. A 40-degree turn is all that is required to make or break the coupling.

The seal ring is an O-ring of synthetic rubber and is easily replaceable. The coupling body is of rugged construction and has a standard 6-inch commercial pipe flange. The mating nipple is available with either flanged or threaded end.

Further information may be secured from the company. Or use the Request Card on page 16. Circle No. 110.

Austrian Engineers Here

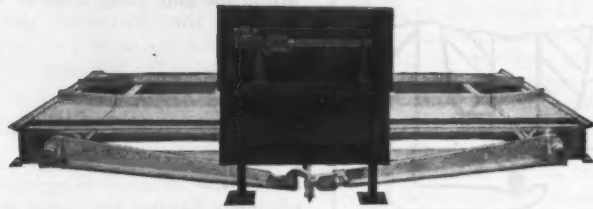
This month seven civilian engineers from Austria, who have been visiting the United States under the auspices of the Economic Cooperation Administration, will end their tour of six multiple-purpose projects of the Army Corps of Engineers.

The visitors have seen the Buggs Island project on the Roanoke River in Virginia and North Carolina; the Altoona project on the Etowah River in Georgia; the Garrison project on the

Missouri River in North Dakota; and the Fort Peck project on the Missouri River in Montana. Early this month they were to see McNary Lock and

Dam on the Columbia River in Oregon and Washington, and the Bonneville project, which is also on the Columbia River.

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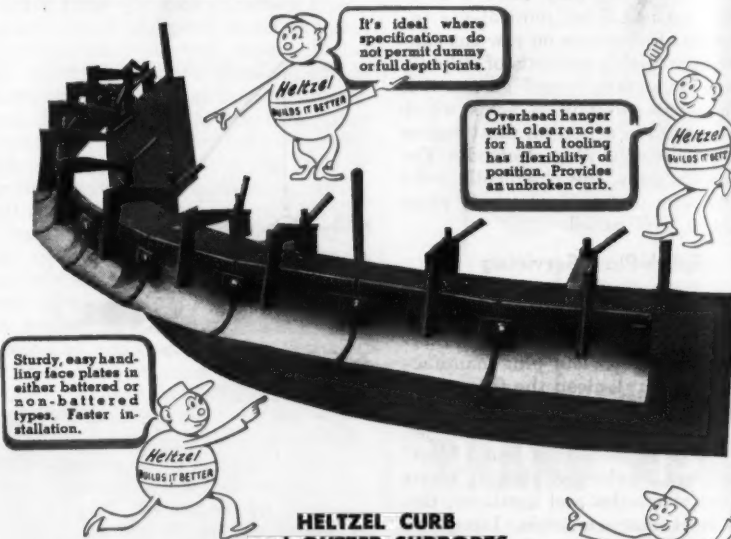
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Sturdy, easy handling face plates in either battered or non-battered types. Faster installation.

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Overhead hanger with clearances for hand tooling has flexibility of position. Provides an unbroken curb.

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The Model 87 Mallsaw rips, crosscuts, and angle-cuts rough or finished lumber. With a special attachment, it can go to work too on plastics, metal, stone, and concrete.

Portable Power Saw

A new 3-inch-capacity heavy-duty portable power saw, designed to rip, crosscut, and angle-cut rough or finished lumber, has been announced by the Power Tool Division of the Mall Tool Co., 7743 S. Chicago Ave., Chicago 19, Ill. Either right or left blade is available on this Model 87 Mallsaw.

A bevel-depth attachment that permits straight cuts from 11/16 inch to 2 31/32 inches and up to 45-degree bevel cuts from 1/4 inch to 1 11/16 inches is also available. There are attachments for grooving mortar joints; cutting plastics, metal, and hardened steel; and mortising, cutting, or scoring compositions, tile, stone, and concrete.

The operator is protected from the saw blade by a telescoping blade guard. The blade housing is of aluminum and magnesium alloy. Ball and needle bearings are used throughout. Both 115-volt and 230-volt ac-dc models are available.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 157.

Ground-Water Control With Perforated Pipe

A new 24-page illustrated booklet, "Armco Perforated Pipe for Controlling Ground Water", has been published by Armco Drainage & Metal Products, Inc., Middletown, Ohio. It describes how ground water can be controlled to provide stable roadbeds and dry subgrades for airports, streets, recreational areas, and industrial sites. Photographs show typical pavement and roadbed failures caused by ground water.

Seven pages of diagrams show typical methods of treating subsurface drainage problems when, for instance, there is a sloping water table or water-bearing strata, a level water table as in level and swampy areas, or a perched water table. The booklet lists structural strength, resistance to impact, strong joints, controlled infiltration area, and economical installation as features of corrugated perforated metal pipe. The booklet also recommends installation methods.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 134.

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WITH
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TRACTOR EXHAUST SHIELD
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QUINCY, ILL.

Safety Inner Soles Avoid Foot Injuries

A new safety inner sole has been developed by Rubberhide Co., Inc., 115 Whitehead Road, Trenton 4, N. J. It consists of a top-grade leather inner sole, a special spring-steel plate, and rubber-frictioned cotton duck, all bonded together with a special cement under extremely heavy pressure. This inner sole is said to be punctureproof and is designed to fit into any conventional work boot or shoe. It protects the worker against foot injuries on the job as a result of stepping on nails, glass, rocks, and other sharp objects.

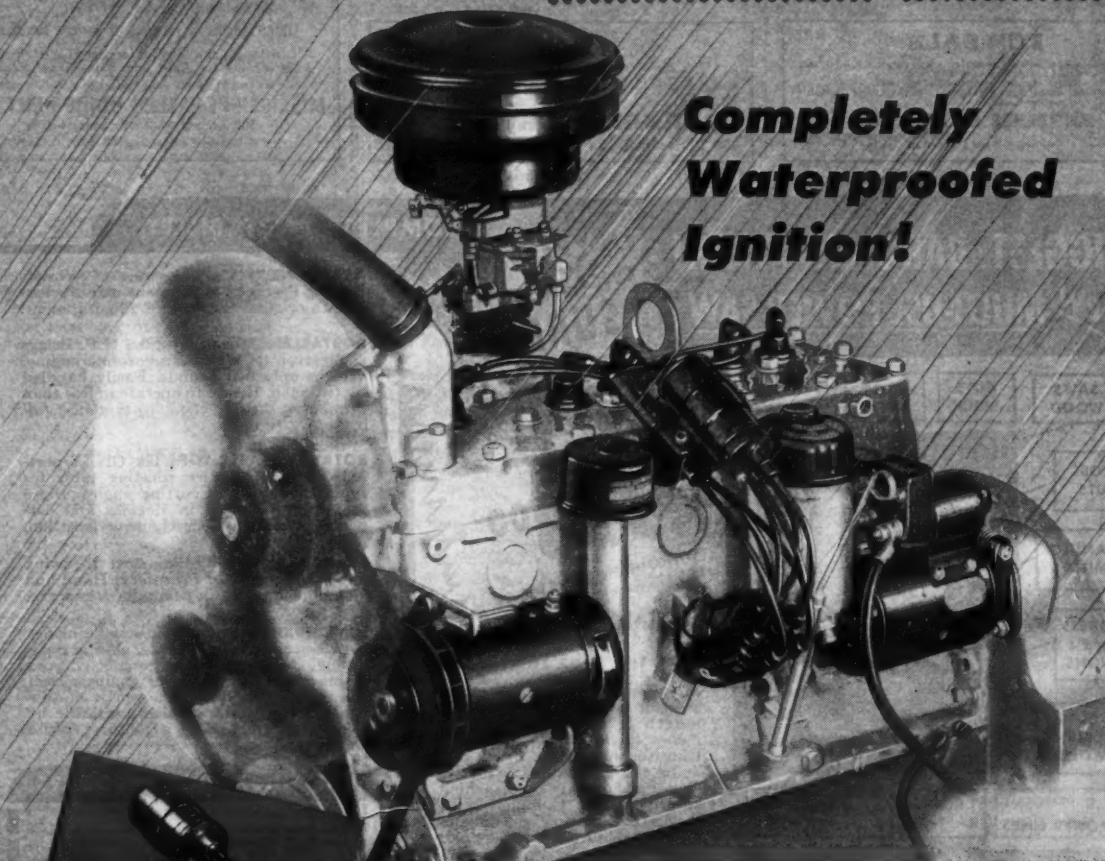
Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 111.



A new Manitowoc Model 4500 excavator operating as a dragline on a railroad job near Kennewick, Wash. Morris-Knudsen Co., Inc., is the contractor.

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**Completely
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all sorts of jobs everywhere. Yet, thanks to Chrysler mass production economies you can buy a Chrysler Industrial Engine for *less money*—and get quick service *anywhere*.

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HD7 Angle Dozer—Gradall on Internat'l. KB-8.
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